

**UNIVERSITY OF LONDON
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Ph.D Thesis

**The Assessment of Problem-Solving in Nursing Education:
An Evaluation of a Simulation Test**

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RESEARCH ABSTRACT

In practice disciplines, such as nursing, there has been increasing concern about examinations, which, it is argued, are problematic, since nurses' performance in written examination appears to bear little relationship to their level of proficiency in the clinical setting. To be realistic, nursing examinations have to be closely related to what the nurse does in practice.

The Problem-Solving Case History, the development and evaluation of which forms the basis of this thesis, was, therefore, developed as a written simulation test involving the care management of a group of patients during a span of duty. The test confronts students with the kind of information they have to interpret and act upon in the clinical situation. This requires them to recall the principles of nursing care in a way similar to real-life.

This study concerns the description and validation of the Problem-Solving Case History. Both qualitative and quantitative approaches are used to evaluate its implementation and to investigate its validity and reliability. A variety of methods was used to collect data for the validation. The methods include thought verbalisation, semi-structured interviewing, questionnaires and statistical tests of reliability. Answers are sought to the following questions:

- How valid and reliable is the PSCH in testing problem-solving skills?
- Can the PSCH test be used as a measure of professional competence?
- Does the PSCH simulate the 'real-life' situation or event?
- How reliable is the judgement made by markers of the students' performance?

There is evidence, from the data analysed, that the PSCH seems to have clear application in nursing education and that it is closely related to practice. Data have elicited the use of problem-solving skills and the individual differences of approach to common tasks.

It is recognised that professional competence can never be assessed fully without the inclusion of performance assessment in the work-place. Nevertheless, written papers will always have a part to play in assessing professional competence.

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This thesis is dedicated to the memory of my son Phillip Michael Labonté who died at the age of 24 years on 20th February 2001.

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CHAPTER 1

INTRODUCTION

For approximately four decades there have been problems associated with the assessment and examination of student nurses. One of the major concerns relates to the measurement of professional competence, or proficiency which determines whether or not an individual is allowed to register and, thereby, practise as a registered nurse.

Nursing is a practice-based profession, and the nurse is engaged in caring for patients, thus, assessment and examination have involved both practical performance and the use of theoretical knowledge in decision making. Skills and theory, though, have, in the main, been assessed separately, and consequently, assessment and examination have come under attack. The call, in nursing education, is for assessment tasks to reflect what students will encounter in the real world and how they (students) problem solve. In addition, separating the assessment of skills and theoretical knowledge is no longer perceived as justifiable since both theory and practice influence each other.

Prior to the late 1980s, the assessment/examination system, in nursing education, was centrally controlled by its statutory body, (the disbanded General Nursing Council), and was firmly rooted within a traditional model which was characterised by the separation of assessment of practical skills and theoretical knowledge; the assessment of lower order cognitive skills; the assessment of a limited range of subjects and the use of a particular range of assessment types, (long essays, multiple choice tests and practical examinations).

The devolution of the assessment system during the late 1980s resulted in a wave of experimentation of assessment formats. One new assessment type is the Problem Solving Case History Test, written simulation tests which present students with the kind of information they have to interpret and act upon in the clinical situation.

This thesis describes the development and evaluation of one of these assessments. The Problem Solving Case History, (PSCH), which is the subject of this investigation, was developed at the beginning of the 1990s with the aim of measuring a learner's ability to use previously acquired knowledge in solving novel problems or completing specific tasks. The learner is presented with written simulated patient situations to elicit their responses.

This study centres on the validity and reliability of the new test (PSCH), particularly focusing on the following:

- Whether students engage themselves in problem solving activities whilst undertaking the written simulation test. This aspect of the study relies heavily on the qualitative approach of engaging subjects in 'thought verbalisation'.
- Testing of intra-rater and inter-rater reliability relating to marking by lecturers. This part of the study involves a quantitative approach, evaluating statistical data.

In this thesis, I attempt to describe the issues raised by the development and implementation of the Problem Solving Case Study Test (PSCH); the concerns expressed by teachers and students; how 'thought verbalization' was undertaken and what the analysis revealed; how

intra-rater and inter-rater reliability were tested and what the analysis revealed; and the participants' perceptions relating to the PSCH's simulation of the 'real-life' situation. The range of methods chosen for this study were such as to allow subjects' experiences to be made manifest in order to contribute data that would help testify the presence or absence of engagement with the constructs it was intended to examine and to evaluate the assessment.

Answers were sought to the following research questions:

- Does the PSCH test problem-solving skills?
- Can the PSCH test be used as a measure of professional competence?
- Does the PSCH simulate the 'real-life' situation or event?
- How reliable is the judgement made by markers of the students' performance?
- What are the issues that concern the subjects involved in the implementation of the PSCH?

These questions are interrelated and represent the need to enquire into the various facets of an innovatory assessment. It should be noted that, since the PSCH is a written simulation exercise, this study did not include observation in the clinical environment, rather it concentrated on thinking skills relating to what one would do in the context of practice. The latter is based on the assumption that judgement of competence can be inferred from an insight into the thought processes involved in accomplishing a task. This follows Hager et al.'s (1994) argument that competence is not something that is directly observed, but inferred from performance.

The study began in 1990 when I started chairing the Curriculum Assessment Working Group

(CAWG) which was set up to develop and recommend to the school of nursing in which I worked a new assessment system. This was in response to the findings of a review of the assessment system, (1990), which indicated the following:

- Teachers' dissatisfaction with the assessment system that was in current use.
- An assessment system which did not reflect a move to a problem-solving approach.
- An assessment system which had remained the same for several years and needed to be reviewed to accommodate recent developments in nursing education.

The CAWG recommended that a range of assessments be used to include the assessment of theoretical and practical capability and professional conduct; and that a progressive or formative assessment strategy be developed to replace the conventional, end of course, summative assessments. The CAWG was further divided into various task groups concerned with the development of assessment formats that formed part of the overall assessment strategy. I chaired the task group responsible for the development of written simulations. The assessment that my group developed became known as the Problem Solving Case History Test.

For this Ph.D I conducted an evaluation of the PSCH which started in 1991. The methods used to gather evaluation data included thought verbalisation, semi-structured interviewing, questionnaires and statistical testing relating to reliability of marking. Information was further supplemented by the committees and boards, (of the School of Nursing and Midwifery), involved in curriculum planning and development, including assessment and examination; these being, in the main, the 'Curriculum Assessment Working Group', and the 'College Examination Board'. All the information was collected over a period commencing in

December 1991 and spanning the whole of 1992 and 1993 and a part of 1994. The field work relating to thought verbalisation was intensive and of short duration, all others were spread out over longer periods. Thought verbalisation was the first field work undertaken as this was perceived to be a crucial element of this investigation: the 'lived experiences' of students as they worked through the simulation exercise would permit an understanding of the thought processes involved when confronted with problems of different complexity.

The evaluation approaches are listed below to set the scene; each is addressed in detail in later chapters.

1. Eight nursing students, approaching the end of their pre-registration course were involved in 'thought verbalisation'. This technique is based upon an information processing model (Newell and Simon 1972, Ericsson and Simon 1980) that views the activities that make up mental events as reflecting a flow of information. The Information processing model views cognitive processes as a sequence of internal states transformed successively by a series of information processors (Ericsson and Simon 1972). Information accessed from the long-term memory and the sensory registers is made available in short-term memory by information processors. As information enters the STM it is attended to and it becomes available for verbalisation. The subjects were asked to 'talk-aloud' whilst performing cognitive tasks associated with attempting the PSCH-written simulation test. The 'talk-aloud' sessions were audio-taped and transcribed.
2. Semi-structured interviews were carried out with ten experienced lecturers from the

college to ascertain their views regarding the test's use in the measurement of professional competence; the test's perceived advantages and disadvantages; and the intended and unintended consequences. They all had special insight in the use of the Problem Solving Case History Test as they had been involved with test construction and marking. They were qualified teachers who had been practising nurses prior to taking on the role of teachers of nurses. On average, it took approximately one hour and fifteen minutes per interview. This method was chosen as it provided the investigator with the opportunity to find out what the key issues were regarding the PSCH test. To assess the impact of the innovation, lecturers were asked about their participation in test construction and marking; the comparison of the PSCH with other assessments; the use and value of the innovation; and marking issues. The semi-structured interviews were tape recorded and transcribed.

3. Data about the views held by students were gathered from 98 student nurses by means of a survey-type questionnaire to obtain both quantitative summary data and open-ended comments. The students were all within the last two months of completing their pre-registration course, and had been assessed by means of a PSCH test on three separate occasions, coinciding with the end of the first, second and third year of study, respectively. The questionnaire focussed on whether the assessment tasks correlated with tasks of the real world and what students perceived as issues of concern.
4. Data were also gathered from clinical staff by means of a semi-structured interview. The data gathered served to inform the researcher about the ways that recently

qualified nurses practise nursing, in particular whether they use a problem solving approach to care. This was relevant to the evaluation as a means to confirm practice trend following registration.

5. Reliability was addressed by looking at the consistency of standards in marking and the consistency of approach.
 - 5.1 The first element of this study related to the consistency of standards in marking and a statistical approach was used here (see chapters 6 & 9). The reliability of marking was assessed by different markers scoring the same piece of work (inter-rater reliability) and the same marker scoring the same piece of work on different occasions (intra-rater reliability). All raters had undergone training and were issued with a set of acceptable responses or exemplars. The marking is not based on a 'grades' model which relies on allocation of marks or points for each correctly answered item. The rater, instead, used a set of guidelines and allocated a pass/fail result based on the standard of the performance and the specified criteria.
 - 5.2 The second element of this study the consistency of approach related to the administration of the tasks. This part of the study drew heavily on comments made by moderators and external examiners involved in this assessment. Moderators and external examiners' reports were examined for comments relating to markers adherence to sets of scoring rubrics called marking guidelines, their views on the wording of the questions and the test's adherence to the criteria specified in the grid design.

The consistency of standards in marking and consistency of approach ensured that

sufficient consideration was given to quality assurance and quality control, (Harlen 1994).

Traditional reliability measures which are based on correlation techniques were not used since they have been found to be inappropriate for performance assessment. They require more items, assuming a normal distribution; they rest on the assumption of high levels of discrimination between individuals; scoring is based on marks, (many performance assessments have a mark base, too); and there is a wide variation in scoring (Shorrocks et al. 1992). The PSCH was not designed to emphasise differences among individuals; furthermore its marking, which relies heavily on professional judgement, does not use a mark based system, thus making it impossible for traditional reliability analysis, via internal consistency measures.

The next chapter explores the purposes of assessment and the issues confronted by nurse educators.

CHAPTER 2

THE RESEARCH PROBLEM

Introduction

There has been a considerable change in the educational preparation of nurses, midwives and health visitors during the past twenty years. The devolution of the assessment system (ENB, 1988); reforms in pre-registration preparation (UKCC 1986); developments in post-registration provision (UKCC, 1993); the integration of nursing and midwifery education into higher education; have all contributed to presenting particular challenges to the assessment of professional competence. The elevation of all pre-registration courses to the diploma level, as a minimum, at the point of registration and the Board's (ENB, 1995) emphasis on the importance of the inter-relationship between theory and practice within the curriculum; have required educational institutions to ensure parity between theory and practice and to develop assessment strategies in which equal value and accreditation is given to the assessment of these two aspects. This brings to the fore the need to consider how professional competence should be assessed at different academic levels and the contribution the assessment of practice makes to an academic award.

This chapter considers the purpose of assessment and the issues confronting nurse education in the light of recent developments in nursing and midwifery education and policy initiatives introduced by the English National Board (ENB) for Nursing, Midwifery and Health Visiting and the United Kingdom Central Council (UKCC) for Nurses, Midwives and Health Visitors.

The Purposes of assessment

Assessment in general has a range of purposes, including the formative ones of diagnosis, evaluation and guidance, and the summative ones of grading, certification, selection and prediction. It is expected to be reliable, valid, fair and feasible and to offer what is usually called, somewhat mechanistically, 'feedback'. The assessment of professional competence has additionally to be able to evaluate practical competence in occupational settings, and to determine the extent that appropriate knowledge has been internalised by the student practitioner, (Bedford et al 1993).

Traditionally, the purpose of assessment has been of a summative nature to gauge in some way the extent to which a student has achieved the aims and objectives of a given course of study or has mastered the skills and processes of some craft or area of professional and technical activity, (Bedford et al. 1993). Assessment for certification makes a discrimination between those who have or have not passed and further ranks those who have passed in terms of the value of their pass. The grade or mark awarded not only says something about the work achieved but something about the individual as a person in relation to others and the kinds of other social rewards that should follow.

In discussing the relationships between testing, assessment and evaluation, Eisner (1993) traced their origins in science whose purpose was "to come to understand how nature works and through such knowledge to control its operations" (p. 219). Through the influence of Thorndike in America and Burt in Britain, psychological testing was founded upon principles modelled upon the mathematical sciences, whose hallmarks were measurement, rationality,

theoretical explanation, and eventually prediction and control. During the educational reforms of the 1960s, particularly relating to the curriculum reform movement, it became clear that standardized achievement tests could not adequately assess the outcomes of the new curricula. As a result of this, new assessment purposes arose: “for the first time, we wanted students to learn how to think like scientists, not just to ingest the products of scientific inquiry” (Eisner, 1993, p. 221). There was a recognition that “we needed to evaluate not only what students learn, but the programme that was intended to enable them to do so”, (p. 221). Evaluation, not merely testing came into its own. This required approaches different to the educational measurement movement:

“Educational evaluation had a mission broader than testing. It was concerned not simply with the movement of student achievement, but with the quality of curriculum content, with the character of the activities in which students were engaged, with the ease with which teachers could gain access to curriculum materials, with the attractiveness of the curriculum’s format, and with multiple outcomes, not only with single ones. In short, the curriculum reform movement gave rise to a richer, more complex conception of evaluation than the one tacit in the practice of educational measurement. Evaluation was conceptualised as part of a complex picture of the practice of education.”

(Eisner 1993, p. 221)

Evaluation, thus, was expected to contribute to the enhancement of practice since there was a shift from regarding evaluation as a predominantly knowledge-seeking activity to a decision making one. According to Eisner,

“to treat curriculum, teaching and evaluation as practical activities is to shift the focus, but also the kind of knowledge considered relevant: The meaning of knowledge slowly, but ineluctably, became related to what Aristotle called *phronesis* or, more simply, *practical*, as distinct from *theoretical* knowledge. It was not concerned with identifying immutable

patterns in nature, but providing context-dependent tentative information useful for making defensible decision”,
(Eisner 1993, p. 222).

Scriven (1967) introduced the terms formative and summative evaluation, (not in the context of assessment), placing attention not simply upon specified outcomes that could be ‘measured’ but also on the quality and purposes of the processes through which attitudes, skills, knowledge and practices are formed. The formative possibilities of evaluation drew attention to the processes of learning, teaching, personal and professional development and the intended and unintended functions of assessment procedures. To address these kinds of processes, methodology shifted from quantitative to qualitative and interpretative approaches which focused upon the lived experiences of classrooms.

Eisner goes on further to indicate that currently “we find ourselves exploring new routes to excellence, partly because we have recognised that mandates do not work, partly because we have come to realize that the measurement of outcomes on instruments that have little predictive or concurrent validity is not an effective way to improve schools, and partly because we have become aware that unless we can create assessment procedures that have more educational validity than those we have been using, change is unlikely” (p. 224).

Eisner argues that the exploration and development of the new approaches to assessment had made some things quite clear, that is, that “assessment, like educational evaluation, is not one but several things. It performs different functions and needs to be regarded in light of the educational functions it is intended to perform” (p. 224). The functions of assessment are summarised as follows:

- It is a kind of educational temperature taking - its purpose is to describe the educational health of the country.
- It provides a gate-keeping function. Gate-keeping functions are served by bar examinations, medical board examinations, nursing examinations and many final course examinations that are used to determine who passes and who does not.
- It determines whether course objectives have been attained. In this, its classical use, assessment in schools is sometimes used for gate-keeping functions and sometimes to help teachers provide remedial help to students who need it.
- It provides feedback to teachers on the quality of their work. The assessment of teaching can help a teacher become more reflective about his or her own performance so that it can be improved.
- It focuses on the quality of the programme that is being provided. Although the least prominent of assessment functions, this function is arguably the most important. If the programme's quality is poor to begin with, the quality of teaching does not matter much: if it's not worth teaching, it is not worth teaching well.

For Eisner, the major areas of focus for educational assessment are programme evaluation, teacher evaluation and student evaluation - 'a growing pluralism'. He believes that the form of assessment needed to help teachers understand how they perform has to be different from the approach designed to describe the general contours of student outcomes.

Eisner's concept of the 'new assessment' has implications for professional/occupational education. The individual, in nursing, is not just perceived as a professional, but is also perceived as having a mandate to act. This mandate arises because the professional has an

authority, a social standing, a body of knowledge through which change can be effected.

Assessment/examination in nursing education: What are the concerns?

During the time that this research was being undertaken Nurse Education was being faced with unprecedented challenges. Nurse Education was having to address the following:

1. The issues surrounding 'fitness for purpose' brought about by a National Health Service (NHS) White Paper, titled "Making a Difference" (DoH, 1999) and the United Kingdom Central Council (UKCC) Commission for Nursing and Midwifery Education, (UKCC, 1999).
2. The issue of clinical competence brought about by the implementation of Project 2000(UKCC, 1986), which represents a major reform of nurse education and the challenges which this brings for nurse educators;
3. Issues brought about by the resulting integration of nurse education into higher education.
4. Issues of assessing student performance in practice settings, as the assessment of competence to practice is considered a pre-requisite to granting a licence to practice;
5. The devolution of assessment and examinations which brought about a burgeoning of untested assessment and examination formats;

A detailed consideration of the above issues is beyond the brief of this review, but reference will be made to indicate that those issues have been considered with regard to the context of the development and evaluation of the Problem Solving Case History Test.

A historical review of literature on nurse education reveals that significant changes have evolved in examinations and assessments of student nurses. The changes have been influenced, in the main, by the following developments and policy statements:

- 1986: The publication of Project 2000: A New Preparation for Practice. This report represented the UKCC's views and ideas about the best way forward for the development of education and training for nursing, midwifery and health visiting. It was also a statement of the Council's perceptions of the roles of these practitioners and of their responsibilities in the delivery of health care.
- 1988: Publication of Circular 1988/57/APS (November 1988). This was a policy statement informing Educational Institutions of the devolution of the assessment system for the pre-registration courses.
- 1998: Publication of a report titled Integrating Theory and Practice in Nursing by the NHS Executive. This report was commissioned by the Chief Nursing Officer/Director of Nursing in response to increasing concern about the 'theory-practice' gap in nursing. . It examined the 'theory-practice' gap in the light of contextual changes, identified issues which have contributed to the continuing perception of the gap and proposes strategies to help better integrate theory and practice..
- 1999: Publication of the UKCC Commission for Nursing and Midwifery Education: Fitness for Practice. This prepared a way forward for pre-registration nursing and midwifery education that supported fitness for practice, an approach based on health care needs.

Following on from the move into Higher Education, there has been a shift in approach for all pre-registration courses, from traditional, centrally controlled formal examinations to

progressive, devolved assessments of theory and practice (Circular 1988/57/APS November 1988); and from public and competitive tests with emphasis on summative strategies to ongoing self assessment and self improvement with emphasis on formative strategies. In many ways 1988 represented a watershed in the development of assessment and examination in nursing education. It was the year in which nurse educators could use their newly acquired freedom, brought about by the devolution of the assessment of theory and practice, and the implementation of the principles of Project 2000, to develop creative and innovative assessment strategies. What was needed was an assessment strategy which was capable to measure students' competence to practise safely and effectively; and respond to the changing needs of health care.

For much of the period prior to and including most of the 1980s, nursing education was dominated centrally by its regulatory bodies and the assessment approach was firmly rooted in the traditional, "disease orientated" type of questions, (Hurst, 1985). The assessment of theory and practice was characterised by an approach which was "patient centred". It used a problem solving slant in an effort to develop nurse examination, which more effectively reflected modern nursing theory and practice. However, it was still perceived as traditional and centrally mandated. It presented problems and limited the scope of assessment to merely determining whether the candidates were safe to practice, which was also the purpose of the centrally controlled registration examination. The content of the examination was restricted to those nursing behaviours which dealt with the fundamental needs of patients in terms of safe and effective practice.

The changing nature of knowledge and changing circumstances with regard to how we

teach/learn/assess constantly brings new problems, which require new solutions, (Mazhindu, 1991) . Transfer of learned principles to clinical practice are learning problems encountered by many nursing students. This may mean that the subject matter of nursing as taught in the classroom is processed by the students in such a way as to meet the requirements of the examinations system, rather than in the context of a meaningful whole, i.e. in relation to what they are doing on the wards. Seminal work by Eve Bendall (1975) certainly indicated that, for many student nurses, what they wrote in examinations about nursing did not predict what they would subsequently do at work in the wards.

Bendall's work supported the findings of Dunn, (1970), who, in a study designed to develop an instrument to measure nursing performance, found no positive relationship between the level of observed performance and the level of knowledge of principles on which the performance was based. The theory-practice gap is mentioned by recent writers such as Mallick (1993) and Fergusson and Jinks (1994).

Theory practice gap in nurse education.

The theory practice gap is the term used frequently by nurses in practice, students, nurse leaders, educators and increasingly by 'non-nurse' service managers. Despite the frequency with which the term is used, it is not well understood and is often used with an expectation of shared meaning and understanding where none exists. Part of the problem, in distinguishing theory from practice, lies in treatment of theory as if it is a matter of fact, rather than as speculative and developmental. This misconception underpins a widespread assumption that theory provides an absolute prescription for practice, rather than a tentative guide to be tested and refined, (NHS Executive, 1998). The problem of the 'gap' is thus, at least in part, to do

with a failure to properly appreciate the nature and value of theory.

According to the NHS Executive, (1998, para. 15) “the idea that there is a gap has inevitably generated negative associations and has tended to conjure up pictures of separation and conflict. It has been observed that the term is simply a metaphor for intra-professional tribal prejudices between clinicians, educators and researchers and that this is why they are so quick to blame one another for the problem”. Progress in this area demands a positive reframing of the problem (Marks-Marran, 1998). There is a need for a fresh look at the problem, focussing less on intra professional rivalries and roles and more on the structures and processes which serve either to integrate or separate theory from practice.

The literature suggests the major problems relate to:

- The difficulty experienced by nurses when trying to transfer classroom theory and or research knowledge to practice, and to a lack of awareness about the relevance of theory to their work, (Cook, 1991). Traditionally it has been the responsibility of nurse teachers to guide students in the transfer of theory to practice and to assist in drawing out theoretical principles from practical exposure, (Cave, 1994), but changes to the organisation of education, (for example the integration of nurse education into higher education), and the roles of teachers has made this more difficult. It is now often the most inexperienced nurses who are charged with the responsibility for integrating theory and practice through demonstration, supervision and guiding reflection on and in practice. Whether nurses are prepared for this complex and highly skilled aspect of their role is questionable. As a result students may work with practitioners who say one thing and do another, or who are unable to fulfil the role

effectively.

- The relevance and utility of theories advocated for practice. A divide is perceived between the esoteric concepts and the real problems of everyday practice when what is taught as theory does not appear to match what is done in practice; a problem largely attributed to the perception that theorists and teachers are out of touch with current practice and that they generate irrelevant theories and models which are impossible to translate into practice, (Rolfe, 1996). Consequently theory is regarded as irrelevant and theorists' and teachers' approaches to care as outdated.
- The relationships among stakeholders. Many believe that the gap relates more to problems in relationships between education and practice than between theory and practice per se, (Malik, 1993; Cave, 1994), and that integration into higher education has made the gap greater than ever, (Garbutt, 1997; Fairbrother and Ford, 1998). Some of these problems relate to differences in priorities and the language each uses, (Andrews and Rees-Jones, 1996). Educationists accuse service colleagues of a lack of understanding about educational processes in higher education, and service colleagues accuse educationists of unrealistic expectations about what can be achieved in practice. Consequently practitioners see nursing as what nurses 'do', whereas educators see it as what nurses 'ought to do'. This problem is not unique to the UK as several authors describe the North American experience and suggest that the theory practice gap became significantly worse when nurse education moved into the university sector, (Cave, 1994). While the physical separation of education from service is for many, a very tangible manifestation of the theory-practice gap, for some the different values held in education and in the health service is more subtle and pervasive, contributing to a rather uneasy alliance, (Hewison and Wildman, 1996).

The theory-practice gap has been a persistent preoccupation despite major changes to education and practice. The ever changing context of health care has ensured the issue and the strong views it attracts have remained a matter of contemporary concern, (NHS Executive, 1998). The existence of a gap is, however, challenged by several writers who indicate that the problem is misconceived. Dale (1994), for example, postulates that there are three types of knowledge: propositional, which is taught in the classroom; practice knowledge; and experiential knowledge. Her view is that only the first two elements are dealt with in pre-registration nurse education. Practice knowledge is fundamental to nursing, and she argues that the gap is the result of teachers and practitioners viewing nursing from different theoretical perspectives that are not linked through the third, experiential, perspective, a view shared by McGaugherty (1992), Malik, (1993), Allmark, (1995), Ashworth and Longmate, (1993), among others who have suggested an approach that avoids a fruitless dichotomy between theory and practice.

According to Ashworth and Longmate (1993), the commonly held view of theory as an abstract, ideal and detached body of recommendations or prescriptions bearing little or no relations to practical settings shows a misunderstanding of the nature of both theory and nursing practice. They argue that nurses use 'theories-in-action' of the situations which they are confronted with, which they may not be aware of and may, therefore, see nursing practice as 'merely lived through experience' (p. 326). They maintain the view that the relationship between theory and practice is intrinsic. This is an important fact when issues surrounding the assessment of performance are considered. The relationship of theory and practice is an important concern in identifying appropriate methods for assessment in nursing education,

for assessing practice, in particular identifying defensible means of assessing the extent to which theory derived from nursing and related disciplines informs practice. This is far from straightforward.

Application of theory to practice: consideration of issues and alternative approaches.

The issue that is central to the assessment of student nurses remains clearly focused on competence and problem-solving. Nursing is a practice profession orientated to providing care for individuals, families and communities to assist them in solving health problems and attaining health goals. This requires of the nurse abilities to apply theory, that is, knowledge in the form of facts and principles, to the relevant clinical practice situation. If students are to transfer knowledge into clinical practice, assessing must foster a student's ability to think quickly and analytically rather than merely recalling facts.

There are numerous suggestions in the literature on how to address the theory-practice gap, but little overall agreement. Most recent research has focused on curricular content, clinical competencies, learning outcomes and the integration of theory and practice in assessment strategies. Ferguson and Jinks (1994) view the problem of integration as multi-dimensional and propose a curriculum planning model incorporating the following eight key areas:

- the curriculum model to be used
- the sequencing of taught content and clinical practice
- the content of the programme
- teaching methods to be used
- assessment criteria

- the role of tutors in the learning process
- the contribution of service staff and
- the influence of the hidden curriculum.

This approach, state Gerrish et. al. (1997), requires significant change in the planning and delivery of nursing programmes with considerable organisational and individual commitment by those responsible for nurse education. Relating to the choice of curriculum models, Upton (1999) warns of caution since the prevailing model of professional education is based on the technical rationality model. This model, according to Rolfe (1996) emphasizes the hierarchy of knowledge, with theory and one's academic status being elevated in status to practice and experiential knowledge. This, it is argued, is contrary to the nature of nursing knowledge, nursing philosophy and contemporary opinion where nursing is viewed as human science (Meleis 1992), which values the lived experience and seeks to understand its meanings and values (Mitchell and Cody 1992). Rolfe (1996 p. 52) argues that the theory practice gap exists because the majority of nursing research is executed from within a 'theoretical framework unsuited to current nursing practice'. Meleis (1992) takes this argument further by stating that because of the contradiction between traditional research philosophy and the essence of nursing, clinical practitioners have not recognized, or valued the relationship between theory, research and practice. The conclusion that could be drawn is that nursing theorists and practising nurses are not collaborating from within the same philosophical framework to develop future nursing knowledge and practice. It would appear that theory obtained from experimental research relating to the clinical experience cannot capture the 'know-how' of varied and complicated clinical situations and that the gestalt of nursing practice is lost in the reductionists' scientific approach.

In an attempt to provide a solution, Rolfe (1996) outlines an educational approach which places equal importance upon formal theory and theory derived out of practice. The nursing praxis model combines the pure and applied sciences, abandoning the hierarchical relationship of theory to practice. The clinical area resumes as the central focus for the student education and becomes the place for generating new, personal knowledge and testing out informal theory. The concept complements Schön's (1991) notion of a reflective practitioner in relation to professional practice, whereby changes in practice are mediated by changes in personal knowledge base network of informal theory.

The 'theory-practice gap' has been characterised as a problem and has been examined from various perspectives. The persistence of the gap suggests that the theory-practice gap can never be entirely closed. Some authors view this tension between theory and practice as essential for change in clinical practice to occur (Rafferty et al. 1996). Indeed Lindsay (1990 p. 34) applauds the presence of such a gap, viewing it as a vital aspect and an 'indication of growth'. Cook (1991) suggests that closing the gap would not only be impossible but possibly undesirable since the proposed solutions are doomed to failure as they fail to grasp the reasons why the incompatibility exists in the first place. He purports that research into the theories which underpin current clinical practices would reveal that nursing practices are underpinned by a theoretical perspective aimed at self preservation rather than being executed in the interests of the patient. There is a strong argument that familiarity with research findings allows nursing a better position from which to negotiate for scarce resources. However, before it can evolve nursing needs to redefine its collective perspective and philosophy as the traditional paradigm of science has not only impeded theory and research, but has also limited nursing practice.

Application of theory to practice: Implications for assessments

The mid 1980s was a watershed in the development of assessments in nursing education as many institutions adopted a continuous route to measuring competency development in students. Within the field of pre-registration nurse education, curriculum planners were encouraged to be innovative in developing more eclectic forms of assessment in practice setting. This has been indicated by a clear move away from the 'ward based practical assessments' so heavily criticised for their lack of validity and reliability (Kehoe and Harker, 1976, Burkey 1984), towards a variety of continuous assessment strategies. Although the English National Board (ENB) has to a large extent influenced this shift by introducing a change in formal policy, nurse education has nevertheless been creative in translating this policy into practice. The nursing literature abounds with accounts of different assessment strategies utilised in practice settings. In particular there has been a move towards introducing more student centred approaches to assessment, including an emphasis on self assessment (Burnard 1987, Burnard 1988; Lyte and Thompson 1990).

The assessment of clinical competence is rather complex and challenging and will remain so for a long time. Defining clinical competence is fraught with difficulty and, therefore, the constituents of competence remain unclear. What is clear from the literature is that the need to assess clinical competence has taken centre stage.

Project 2000: A New Preparation For Practice (UKCC 1986) represents a major reform of nurse education in Great Britain. The new structure involved an 18 month Higher Education based Common Foundation Programme, which was shared by all four branches

of Nursing: Mental Health, Learning Disability, Children's Nursing and Adult Nursing. Following the initial 18-month programme, students specialise in the branch of nursing for which they hoped to become registered. The programmes show an increasing emphasis on what were described as the 'supporting behavioural sciences'. This resulted in some curricula moving away from a focus on developing individuals who could deliver nursing care, to developing nurses who understood the context in which they were practising (the knowledgeable doer, UKCC, 1986).

In proposing the case for a 'knowledgeable doer', the UKCC identifies the need for a practitioner who possesses a sound knowledge base and who is able to apply effectively this knowledge to practice. According to Gerrish (1992) this may prove to be problematic since the nature of both nursing knowledge and nursing practice present the student with particular difficulties as neither nursing theory nor nursing practice can be viewed as wholes. She points out that the student studies knowledge derived from nursing, the biological, behavioural and social sciences, ethics and research, and is then required to synthesise the knowledge from these different disciplines to form a coherent whole. She goes on to say that practice is similarly fragmented in that the student is subject to different experiences in each practice setting - (for example practice is classified by age, care of elderly; medical treatment, medicine; disease, oncology; and system, renal). The student being faced with the prospect of attempting to make sense of the total experience by developing a concept of nursing practice is then required to apply the assimilated theory to the assimilated practice. Gerrish (1992) argues that "this is a particularly difficult task unless it is ensured that the theory taught has direct relevance to the practice experienced." This, in my view, spells out the kind of challenge for the assessment of clinical competence.

The implementation of Project 2000 saw the introduction of diploma level education leading to registration as a nurse and, along with the incorporation of pre and post-registration nursing and midwifery education within higher education, the problems associated with the assessment of practice at different levels has been brought into focus. In some instances, individuals studying on the new three-year programme had very little to do with patients in their first eighteen months and placement in practice tended to be short, with students having little time to rehearse skills in an environment with which they were familiar (UKCC, 1999). This led critics to conclude that the newly qualified practitioners were not necessarily competent to practise the skills traditionally associated with nursing on qualifying (University of Warwick and University of Liverpool, 1996).

Fitness for Practice. In response to the concern about the capacity of pre-registration nurse education programmes to prepare newly qualified nurses to practice competently, The Department of Health published a White Paper titled 'Making a Difference' which states that the National Health Service needs practitioners who 'are fit for purpose, with excellent skills, and the knowledge and ability to provide the best care possible' (DoH 1999). According to Daly (2001) this statement is based on the assumption that nurses should possess a range of competencies on qualification that equips them for contemporary nursing practice. The UKCC's response was the publication of 'Fitness for Practice' (1999), which distinguishes three types of fitness: 'fitness for practice' taking into account the evolution of the scope and nature of practice over time; 'fitness for purpose' in which rapid changes in context and content of health care necessitates constant professional up-dating; and 'fitness for award' which is concerned only with academic achievement. In the light of these distinctions the UKCC (1999) recommends that pre-registration education should be based on competency

principles, which strongly suggests that assessment of students would focus on the practice context. In examining the needs for nursing education for the next millennium the UKCC (1999) supports the continued provision of nursing education within a higher education setting but re-emphasizes the need to ensure 'fitness for purpose' and 'competence to practise' as outcomes of three year programmes leading to Registration.

Central to the debate regarding 'assessment at different levels' is the growing awareness of the need to consider the contribution that practice-based learning makes to an academic award. The fact that recent policy initiatives (ENB 1995) have stressed the importance of the inter-relationship between theory and practice within the curriculum, has meant that parity be ensured between the two components requiring educational institutions to develop assessment strategies in which equal value and accreditation is given to the assessment of both theory and practice. This argues, Gerrish (1997 p.8) "brings to the fore a need to consider the criteria by which performance in practice is assessed at different academic levels and the contribution it makes to an academic award linked with this is the meaning attached to 'level'".

Relating to pre-registration courses there has been considerable debate as to what constituted 'diploma level' and, importantly, its distinctiveness from 'degree level'. Gerrish (1997) indicates that there are no precise indicators of what the difference between a diplomate and a graduate practitioner should be despite the 'standard set of learning outcomes' specified by the Nurses, Midwives and Health Visitors Act (1979). She goes on to say (p. 9) that "while differences in academic attainment are reflected in the learning outcomes and assessment of the theoretical component of respective programmes, differences relating to practice remain

largely uncharted". This problem, according to Gerrish is not unique to nursing as professional concerns about the outcome of awards which hold both professional and academic recognition have been mirrored by wider academic concerns about the outcomes of higher education and, in particular, what constitutes 'graduateness'.

Credit accumulation and transfer schemes (CATS) has been one such development in response to consumer market. These schemes, based on a simple 'currency', created a tariff system of credit points and levels which facilitated the processes of accumulation and exchange (Raban 1992). CATS, and the UKCC and Board framework for continuing professional nursing and midwifery education, according to Reed and Procter (1995), raise significant questions concerning the assessment of clinical competence. In their view, it is not just concerned with the specification of a threshold level, it also involves a judgement as to the degree to which the level has been achieved. They indicate that there is no consensus as to what constitutes level 3 practice, or how it can be distinguished from level 2.

In conclusion, in order to meet the changing requirements, it will be necessary to accredit students' practice experience.

The current trend in the assessment of practice seems to reflect two discernible approaches: assessment based on direct observation of students' performance in practice and assessment of written documentary evidence of performance in practice (Gerrish 1997). Observation of performance focuses on students' ability to demonstrate the achievement of specific learning outcomes specified by the UKCC. Written documentary evidence comprises mostly of portfolios in which students collect different types of evidence relating to their practice,

including a written reflective account of their learning in the form of a diary or critical incidents. Both approaches require students to include a discussion of the knowledge base underpinning performance. This, according to Gerrish raises questions as to the validity of these approaches. Gerrish (1997 p. 70) indicates that “a major concern regarding validity and reliability lay with differences between assessing students in practice by direct observation and written accounts. Written accounts allowed work to be marked by more than one examiner and moderated by an external examiner, with performance in practice, the decision about the standard of performance rested with the practice assessor. Although many programmes required students to produce written evidence of their achievement in practice, there was an acknowledgement that this did not necessarily indicate their ability to actually care for patients”. Documentary evidence from Gerrish’s (1997) investigation indicates that since validity and reliability of assessment of practice have been a major concern for over twenty years, there appears to be a sense of regret that many of the new approaches to assessment have been implemented without a trial run before introduction.

Summary of assessment/examination issues.

The literature considered so far has highlighted the issues facing educators as they strive to respond to developments that are influencing the direction of nursing and midwifery education; implement the Board’s requirements for the assessment of practice; respond to stakeholders’ need for practitioners who are fit for purpose with excellent skills and knowledge and ability to provide the best care possible; respond to general educational issues which have a direct influence on other disciplines and professional groupings; and, to resolve the tensions that exist between theory and practice.

From a professional perspective, particularly relating to nursing and midwifery education the issues are as follows:

1. The assessment of clinical competence is a complex issue that has to take account of a variety of constituents and contexts.
2. There is a need to ensure that certain elements of domain competencies relate adequately to standards of practice.
3. The examination of the transfer of knowledge requires the consideration of integrative assessment methods.
4. There is a need to recognise the complexities of developing rigorous approaches to the assessment of practice at different academic levels, (diploma, degree, masters).
5. There is a need to consider how practice assessed by direct observation can be graded and, in particular, how to differentiate between the minimum standard required for safe practice and practice of a higher standard.
6. How parity between the assessment of theory and practice could be conceptualised and reflected in the inter-relationship between theory and practice.

The way forward: the Problem Solving Case History as a possible contribution.

The task that nurse educationists must face is how best to design assessment which will provide good quality information about students' performance without the distortion of good teaching practice. Gipps (1994) sums up this task in the following statement: "we must explore other forms of assessment which can be used alongside accountability assessment to support learning, and criteria by which we can evaluate them If we wish to foster higher order skills including application of knowledge, investigation, analysing, reasoning

and interpretation then we need our assessment system to reflect that”(p. 4).

It is not the scope of this study to explore models of learning in conjunction with nurse education. There appears to be a shift from training to education where the role of the teacher, within the teacher - learner relationship shows a shift from an authoritative, autonomous, and status positional role to one which is participatory, democratic, co-operative and interdependent. Evaluation and assessment have also shifted from one that is characterised by control, public and competitive tests, and emphasis on summative assessment to one which is characterised by self assessment, self improvement, ongoing assessment, and emphasis on formative strategies. Within the progressive educational ideology, nurse education fosters learning which has relevance for the whole person; is significant, meaningful and experiential; such learning has a quality of personal involvement; is pervasive and its essence is meaning, (Rogers, 1983).

Those factors, mentioned above, were born in mind in the development of an assessment strategy which reflected some of the ideas which figure in Eisner's work and the characteristics which figure in Wood's (1986, p.194) proposals for educational measurement which:

- deals with individual's achievement relative to himself rather than to others;
- seeks to test for competence rather than intelligence;
- takes place in relatively uncontrolled conditions and so does not produce 'well behaved' data;
- looks for 'best' rather than 'typical' performances;

- is most effective when rules and regulations characteristic of standardised testing are relaxed;
- embodies a constructive outlook on assessment where the aim is to help rather than sentence the individual; and

The development of the Problem Solving Case History Test was born out of a consideration of the issues explored in the above debate and the theory practice gap. The PSCH allows recall, application, selection and problem-solving to be assessed. It is related to what the nurse would do in practice because the case history aims to be realistic and allows the nurse to describe, or discuss what she would do. The use of several patients allows for a reasonably wide area of the curriculum to be assessed. In my view, it goes a long way to addressing some of the issues raised by Eisner (1993), particularly relating to 'how students problem-solve', 'the values of the intellectual community - the intellectual competencies', 'reflection of the real world', 'relevance to taught curriculum' and so on. The PSCH does not purport to assess overall occupational competence, since it is a written simulation test and will probably be too narrow a base. Rather, it is seen as an element of the assessment of overall occupational competence along with other forms of assessment, such as direct observation of work activities, projects, log books, portfolios, etc.

If there is a case for problem solving tests in nursing education, what are the implications for nurse educators? What do constitute tests of problem-solving and professional competence? How can they be constructed, marked, evaluated and validated? Such questions can only be answered by appropriate empirical research and this research sets out to illuminate some of these.

The next chapter explores some of the attempts made in addressing some of the problems posed by the complexity of assessing professional competence.

CHAPTER 3

LITERATURE REVIEW

THE NOTION OF PROFESSIONAL COMPETENCE

As indicated in chapter 2, issues relating to the assessment of student nurses are sharply focused on determining competency to practise and the ability to think quickly and analytically when transferring knowledge into clinical practice. The assessment of professional competence, thus, is central to any debate which involves passing judgement about nurses' registration or licensure to practice.

The assessment of professional competence in occupational settings has additionally to be able to evaluate practical competence in occupational settings, and to determine the extent that appropriate knowledge has been internalised by the student practitioner.

The assessment of professional competence would seem straightforward if it were not that considerable controversy and confusion over what is to count as 'competence' takes place at every level in the system. If the intended outcomes of assessment are to ensure that certain levels of competence are achieved so that employers and clients can be assured of the quality, knowledge and proficiency of those who have passed, it is then important that an analysis of the 'assessment of competence' be undertaken. It is important that one is clear about the concept being referred to, that is, 'competence' and what distinguishes the various levels of competence.

Definition of competence

To all intents and purposes, the Oxford English Dictionary reveals that "competence" and "competency" can be used interchangeably. Competence indicates "a sufficiency of; sufficiency of qualification; capacity to deal adequately with a subject; a sufficient supply; a sufficiency, without superfluity, of the means of life." According to Collins, (1987), the term competence or competency is often misused when references are made to "minimum competency", "maximum competency" and "functional competency". He argues that since it is generally recognised that mere competency is not enough, the frequent references to the aforementioned terms by educators smacks of redundancy. He indicates that it is worth noting that competency conveys a sense of 'competing' or 'vying', but points out that the foremost meaning of the adjectival form, competent, is expressed in terms of 'suitable', 'fit', 'proper', terms, which in his views, highlight the very close correspondence between the concepts of competency and relevance.

A simplistic view of competence relates to the ability to perform particular activities to prescribed standards, (Hager et al, 1994; E.N.B, 1993). A view that is reflected in the YTS Guidance Notes:, (in Wolf, 1995, p.31) "by competent we mean performing at the standards expected of an employee doing the same job." This view suggests that competence is thought of as the capacity to perform successfully a series of discreet observable tasks. This view of competence, claims Wolf (1995, p.7) implies a "mechanistic and atomistic" approach to learning. This, she suggests would involve a process of defining standards and expressing competence in terms of outcomes. Wolf warns that this is at odds with the purposes of a competence-based system since what is integrated in reality is often disaggregated in the outcome specification. The other view of competence relates to a "possession of a series of

desirable attributes including knowledge of appropriate sorts, skills and abilities such as problem-solving, analysis, communication, pattern recognition and attitudes of appropriate kinds." (Wolf, 1995, p.40).

Miller et al. (1988) suggest two senses in which competence can be defined: competence equating with performance, referring descriptively to an activity, and competence as a quality or state of being of an individual. The latter, suggests Runciman (1990) is difficult to observe, but it can be seen through the individual's competent performance. Those two senses are thus not mutually exclusive. In an article examining ways of arriving at competences Gale and Pol (1977) appear to articulate those two senses. For them, the factors which bind competence to a role are the abilities, skills, judgements, attitudes and values required for successful functioning in that position. This view is also reflected by Ellis (1988, p.47/48) who states that "competence must refer to the total of observable behaviours characterised and specified in relation to measurable standards and, perhaps indefinitely, competence will also refer to unobservable attributes, capacities, dispositions, attitudes and values." Ellis's statement, at first glance, although appearing to suggest the two senses of competence, nevertheless, casts doubt and uncertainty about the nature of competence. Ellis, it would appear, warns the reader of the complexity of competence and even goes as far as to suggest that competence may even be unobservable, particularly when reference is made to attributes such as dispositions, attitudes and values.

Can competence, then, really be observed? Wilmut and Macintosh (1994, p.3) postulate that competence "cannot be directly observed". Referring to competence as a 'deep structure', they argue that "we can observe performance, but this may or may not provide an accurate insight into competence", an issue which is discussed in some detail by Wood and Power (1987).

Their attempt at unravelling the complexities and levels of competence, has led them to suggest that the "development of competence as a coherent structure may take a number of years and for this reason alone performances may be inconsistent, even assuming that the tasks which have been chosen to elicit the competence are entirely appropriate" (p.3), a view which is also taken by Gonczi (1993) and Hager, Gonczi and Athanasou (1994).

Gonczi (1994) describes three conceptions of the nature of the competence which is inferred.

He refers to them as:

- Task-based - where competence is seen in terms of the satisfactory completion of a large number of discrete, small-scale tasks, but with no exploration of the connections between them.
- The general attributes of a practitioner which are required when dealing with some underlying domains such as knowledge of critical thinking ability.
- The link between tasks and general attributes, that is setting the performance of particular tasks into a context of general attributes.

Hager et al. (1994, p.4) refer to this conception as 'integrated conception' where "competence is conceptualised in terms of knowledge, abilities, skills and attitudes displayed in the context of a carefully chosen set of realistic professional tasks which are of an appropriate level of generality." A feature of this integrated approach, according to Hager et al. (P.4) "is that it avoids the problem of a myriad of tasks by selecting key tasks or elements that are central to the practice of the profession." In their view such an approach helps to capture the 'holistic richness of professional practice'.

Distinction between 'atomistic' and 'holistic' views of competence

With reference to competence standards, Hager et al. (1994) draw the distinctions between the terms 'atomistic' and 'holistic' which, they state, have no clear-cut meaning. The fragmenting of an occupation into a myriad of tasks is, in their view, overly atomistic since actual work practice is much richer than sequences of these isolated tasks. What they perceive as 'holistic' is the overall approach but warn that this may fail to provide any synthesis of the tasks. They argue that one should avoid adhering strictly to either 'atomistic' or 'holistic' approaches, but rather that one should strike a balance between the two. They state that, (p.5), "in practice, some degree of atomism in approaches to competence will be acceptable, provided that it is accompanied by a suitable degree of holism." From this perspective, they argue that competence is not something that is directly observed, instead it is inferred from performance.

Hager et al's. integrated approach is somewhat synonymous with Mitchell's (1992) 'all-rounded' concept of competence which is perceived as "getting at what may be called the 'soft skills' such as interpersonal relations, and task or people management (e.g. prioritising conflicting demands, co-ordinating one's work with members of a team)." Competence, thus, is about being open to change, being adaptable, being able to interact with others - both those inside the organisation and without.

Hager et al. (p.6) state that "the integrated approach gets as close as possible to delineating what competence in an occupation actually consists of." They argue that competence standards based on the integrated approach can "reflect the actual richness of work, the use of knowledge in action and the intelligent judgement the hallmark of occupational

competence." The issue for Hager et al. is whether it is possible to measure what is described in integrated occupational competence standards. In their view there would be nothing about the nature of what is described in the integrated occupational competence standards that would prevent it being measured in principle. This belief is well supported by Wilmut and Macintosh (1994) who view the competence-based system as related to criterion referencing where the performance of an individual is assessed against pre-established criteria. They point out that "judgements are based on evidence gathered from performances about whether or not an individual meets particular criteria." (P.4)

Knowledge in action: a hallmark of occupational competence?

Both Hager et al. and Gonczi have referred to 'knowledge in action' as a hallmark of occupational competence, however, clarification of this key concept appears to have eluded them. If one is to be clear about what it is that one is passing judgement on with regard to professional competence, it is then imperative that one's cognizance of this concept leaves little room for misunderstanding. 'Knowledge in action' is reminiscent of Schön's (1983) concept of 'knowing in practice', a process by which the practitioners handle the value conflict, uniqueness, and complex situations in the practice setting and the intuition used to make sense of that practice situation in making professional judgements. 'knowing in practice' emanates from work on 'action theories' (espoused theories and theories-in-use), Argyris and Schön (1974) and Schön's (1983, 1987) work on technical rationality and reflective practice. Schön alerted professional educators to the inadequacies of a purely applied science (technical rationality) view of professional practice and education. 'Espoused theories' are theories of action to which practitioners claim allegiance and which they communicate deliberately to others (Schön's view of 'technical rationality'), in contrast 'theories in use' are

the theories which actually govern and issue in practice. Greenwood (1993, p.1184) states that "'theories in use' of real world situations are constructed in and through repeated exposure to such real world situations. Their function is to render subsequent experience of the same or similar situations meaningful and manageable". Thus, 'theories in use' are deployed largely in the real world situation and triggered by patients/clients, nurse practitioners, clinical facilities, whereas 'espoused theories' are triggered mostly by assessments/assignments, teachers and classrooms. Argyris and Schön (1974, p.7) warn of possible discrepancies between espoused theories and theories in use. They indicate that, in principle, "both theories can be the same alternatively, they may differ but be compatible or differ and be incompatible".

Technical rationality is Schön's (1983, 1987) terminology for a pure 'applied science' view of professional practice. Technical rationality views rigorous professional practice as instrumental problem solving through the application of scientific theory and technique. Greenwood (1993, p.1185) refers to this view as 'systematic problem solving', which, she suggests presupposes one of two alternative conditions: "first that the problem has already been identified or, second, that the ends are fixed, clear or, at the very least, agreed upon." This orderly view of the practice world rarely exists, since, as indicated by Greenwood, (p.1185), "the problems of practice do not present themselves ready labelled for solution". "Uncertainty" is the description that Schön uses when referring to the practice situation. He views this notion as central to professional practice where problems of practice are perceived as complex and the whole situation is viewed as unique, unstable and uncertain. He argues that problem-solving in the practice situation does not rest entirely on scientific knowledge, (instrumental problem-solving), but, rather on non technical processes since, he posits, the application of scientific knowledge depends on agreement about ends - when ends are fixed

and clear. This argument rests on the premise that there is no problem to solve as long as the ends remain confused and confusing. The complexity of the practice situation, when this is characterised by confused and conflicting ends, cannot, in his view, be resolved simply by the use of techniques derived from applied research. His argument is based on the notion that practitioners' resolution of conflicting situations is through a kind of inquiry which falls outside the model of technical rationality. An enquiry which he describes as the process of 'reflection in action', or 'Professional Artistry'. The process of 'reflection in action', argues Schön, (1987, p.35) "is central to the art by which practitioners sometimes deal with situations of uncertainty, instability, uniqueness and value conflict".

Competence and reflective practice

It is clear then that unique and complex situations of everyday practice are insolvable by technical rational approaches alone. Acknowledging this fact, Schön (1987) proposes an epistemology of practice which places technical problem solving within the broader context of reflective enquiry or reflective practice. He theorizes that there are two constituent elements to reflective practice, namely, 'reflection-in-action' and 'reflection-on-action'. Schön's view of 'reflection-in-action' is that it occurs while practising and is usually stimulated by surprise. In contrast, 'reflection-on-action' involves a cognitive postmortem involving the practitioner looking back on experiences. Schön (1987) points out that while a professional is consciously aware of the knowledge used while reflecting-on-action, this may not be so for reflection-in-action, and, therefore, it may be difficult for practitioners to articulate the knowledge they are using in action. Schön argues, (p.31), that "reflection-in-action is a process we can deliver without being able to say what we are doing". He refers to this as 'tacit knowing in action' and points out that the professional is dependent on tacit

recognitions, judgements and skilful performance even when he is making conscious use of research based theories and techniques.

Within technical rationality we see the familiar hierarchy in which practice is said to be guided by principles of the applied sciences; the applied sciences are guided in turn by the basic sciences. Practice is assigned the lowest value in the hierarchy, and the highest status is assigned to theory and to those who conduct theory building research. According to Munby et al. (1989) Schön builds his position by distinguishing between 'problem-solving' and 'problem-setting'. For Schön, it is inadequate to reduce the work of practitioners to mere problem-solving, because that view neglects and denies the practitioner's ability to identify and redefine the problems of practice. While technical rationality has ignored and masked the problem-setting aspects of a professional practitioner's work, Schön sees this situation as one that is changing.

"They (professionals) are coming to recognize that although problem-setting is a necessary condition for technical problem solving, it is not itself a technical problem. When we set the problem, we select what we will treat as the 'things' of the situation, we set the boundaries of our attention to it, and we impose upon it a coherence which allows us to say what is wrong and in what directions the situation needs to be changed. Problem-setting is a process in which, interactively, we name the things to which we will attend and frame the context in which we will attend to them."

(Schön, 1983, p:40)

Problem identification, thus, depends upon the practitioner's ability to make sense of the situation, that is, to construct the problem from the problematic situation. What this implies is that the practitioner must first select what aspects of the situation to attend to and this in turn is a function of the interpretative frameworks which are used to structure the situation. Such structuring, states Greenwood (1993) is 'interactive naming and framing' and reflects

the professional artistry of practice. Problem setting, states Greenwood, (p.1185) "cannot be resolved by the techniques derived from science. It is, rather, through the non-technical process of framing the problematic situation that it may be organised and ends and means clarified this is because applied/applicable theory deals in general concepts and always require application to the parameters of the individual case."

For Schön, knowing in action refers to our unstable, tacit knowledge that drives our actions. Reflection in action refers to what happens when we are presented with novel puzzles. He argues that the effective professional is characterised by his ability to recognize and explore puzzling events that occur during the activities of practice, while the 'burned-out' practitioner is seen as one whose practice is 'repetitive and routine', neglectful of 'important opportunities to think about what he is doing'. Where technical rationality separates means from ends, research from practice, and knowing from doing, reflection-in-action unites these categories: "practice is a kind of research means and ends are framed interdependently inquiry is a transition with the situation in which knowing and doing are inseparable", (p.165). The puzzles and uncertainties of practice are addressed dialectically, not logically; they are addressed in action, not 'reflectively', either during or after action. This is what Schön refers to as 'reflection in action'. Reframing is played out in a new course of action that reveals the full meaning of the new frame, as well as its consequences. 'Reflection', typically suggests thinking about action, but the crucial phase is 'in action'. The reflection that Schön is calling attention to is *in the action*, not in associated thinking about action.

Schön's debate about 'reflection-in-action' as an epistemology of practice indicates that he is concerned to show that the demands of professional education must go beyond what is typically associated with teaching within the framework of technical rationality. What is clear

is that he believes that the professional deals with two kinds of knowledge, scientific, which he refers to as technical rationality and non-scientific which he refers to as theory in action resulting from reflection-in-action. Schön also suggests that intuitive knowledge is integral to the life of the professional.

Referring to the two types of reflective skills, Schön states that when a practitioner reflects in and on his practice, "the possible objects of his reflection are as varied as the kind of phenomenon before him and the systems of knowing and practice which he brings to them. He may reflect on the tacit norms and appreciations which underline a judgement or on the strategies and theories implicit in the pattern of behaviour." He goes on to say that the practitioner may reflect on the feeling of a situation which has led him to adopt a particular course of action, on the way in which he has framed the problem he is trying to solve, or on the role he has constructed for himself within a large institutional context. In these several modes, Schön suggests that reflection-in-action is central to the art through which practitioners sometimes cope with the troublesome 'divergent' situations of practice. He clarifies his view of the professional by stating that one of the hallmarks of the professional is his ability to take a convergent knowledge base and convert it into professional services that are tailored to the unique requirement of the client system, a process which demands divergent thinking skills. He postulates that when the professional is confronted with a phenomenon which eludes the ordinary categories of knowledge-in-practice, he may surface and criticise his initial understanding of the phenomenon, construct new descriptions and test the new descriptions by 'on the spot' experiment. He indicates that, sometime, the professional arrives at a new theory of the phenomenon by articulating a feeling he has about it.

Schön's epistemology of practice adds a new perspective on the theory-practice relationship.

His view of a kind of knowledge that resides in action elevates the nature of professional knowledge to a position not previously held, and provides us with a way to understand the limited usefulness of technical rationality in professional action. In doing so, Schön's work adds to the complexity of professional competence, since it is neither adequate nor is it acceptable that one should only be concerned with knowledge based on technical rationality. Schön's debate adds a different perspective to problem-solving which goes beyond the requirement of applied scientific knowledge, (instrumental problem-solving). He places problem-solving squarely in practice through the process of 'reflection in action'. Schön's debate requires one to examine the construct 'problem-solving' and establish whether it rests entirely within 'technical rationality'.

Competence and Problem-Solving

Problem-solving is perceived as one of the desirable attributes of competence, (Hager et al., 1994; Gonczi, 1993). The heart of professional nursing, argues Kelly, (1964) is the ability of the nurse to select, assemble and use various observations and other information about the patient to reach a judgement about the state of the patient's health. Judgement, according to Gordon (1982) involves a careful evaluation and assertion of an opinion based on specialized knowledge. Gordon goes on to argue that the judgement process is not a simple transduction of information to judgement, but that it includes going beyond the information given. Thus the knowledge and cognitive process of the judge are added to the information collected to arrive at a judgement (Newell and Simon, 1972). This perspective of judgement making, thus enables the nurse to select the most effective course of action/s in developing an appropriate care plan to address what the patient/client perceives as a health need or problem.

This ability, I would argue, is central to the safe and effective delivery of health care - the essence of professional competence. It has been described as 'the diagnostic reasoning process', (Tanner et al., 1987); 'clinical judgement process', (Itano, 1989); 'clinical decision making process' (Maggs, 1993); 'nursing process' (Little and Carnivali, 1975; Johnson and Davis, 1975). Whatever the terminology, what is clear is that problem solving processes underlie nurses activities in meeting patients needs or resolving both patients and nurses problems. This view is further re-emphasized by Munro, (1982, p. 36) who states that "in the provision of care the professional nurse aims for competence in a systematic deliberative process of clinical judgement and decision making, a process variously described as: the scientific method, the systematic problem solving process." This process, argues Munro, is the foundation of nursing education programmes and is the basis upon which the competence of both the student and the practising nurse must ultimately be assessed. Problem solving, which, itself, is a thought process, exhibits itself, in nursing, through observable decisions and actions. The teaching and evaluation of clinical problem solving skills is one of the greatest challenges facing nursing today. So, what is problem-solving?

Problem-Solving

Problem solving is perceived as one of human beings' continuing cognitive activities, for which a whole range of cognitive skills is required in order to be successful. According to Newell and Simon, (1972), problem solving involves, "selective information processing both from the current task or problem, and from previously completed similar problems as a rapid series of steps of selective searching and matching of problem and solution, or of action and outcome." From the above, it can be inferred that problem solving is a cognitive process which involves transferring the knowledge or information from one given situation and

applying it into another situation so that appropriate solution/s can be taken. According to Gagné, (1967), these actions and decisions depict the highest level of behaviour, behaviour dependent upon the previous acquisition of facts, concepts and principles, and the ability to interpret, analyse and evaluate data.

Judging by the literature, most theories concerning problem solving - in a general sense - describe the following process (Dewey, 1910; Maier, 1930, Newell and Simon, 1972; Polya, 1957).

- First the problem solver tries to represent the problem internally; this is sometimes called the phase of encoding. Information, states Simon and Newell (1970, p. 157) “comes to the human problem solver in the form of statements in natural language and visual displays. For information to be exchanged between these external sources and the mind, it must be encoded and decoded. The information as represented externally must be transformed to match the representations in which it is held inside.” This stage tends to equate Johnson's (1972) preparation phase characterised by intellectual processes involved in assimilating the problem statement. This first stage is described by Schön (1987) as 'problem identification', which involves the subject making sense of the situation or constructing the problem from the problematic situation. This initial representation, encoding, can influence the solving process that follows (Resnick and Glaser, 1976).
- Second he or she tries to build up a suitable representation or conception of a problem (De Groot, 1978). This is referred as constructing a problem space, (Newell and Simon, 1972 : 810), i.e., a conceptual structure that includes domain specific and strategic knowledge and other useful information relevant to the task. This is the way

a particular subject represents the task in order to work on it. According to Simon and Newell (1970), subjects who are faced with problem-solving tasks represent the problem environment in internal memory as a space of possible situations to be searched in order to find that situation which corresponds to the solution. Retrieval of possibly useful knowledge from memory is, therefore, quite important in this stage.

This stage is invariably referred to by Schön (1987) as 'problem setting' which involves the selection of what one will treat as the 'things' of the situation. Schön views problem setting as a process in which, 'interactively', we name the things to which we will attend and frame the context in which we will attend to them.

- Third, he or she tries to solve the problem by transforming his conception of the problem. The problem could be identified as a familiar one and previously learned solution methods can be applied in this case. Otherwise more general methods, such as heuristics (feature analysis, means - end - analysis) are needed (Meijer and Riemersma, 1986; Newell, Shaw and Simpson, 1958).
- Fourth, the solution, the way it was arrived at and the problem solving process are evaluated, (Reid's (1951) goal state and Johnson's (1972) evaluation phase).

This model appears to be less instrumental; it is, however, quite general and relations between the stages in the problem - solving process are hardly specified (Meijer and Riemersma, 1986). There are, however, three important and useful elements:-

1. Domain - Specific knowledge base.
2. Heuristic and strategic knowledge and
3. Problem representation.

1. Domain specific knowledge base.

According to Meijer and Fréiermersma, (1986, p. 4), to solve a problem in any domain, "one needs knowledge of the particular domain in question, but also general perceptual, linguistic and semantic knowledge." Some authors refer to parts of this knowledge as organised in schemata (Norman and Rumelhart, 1975). There is an assumption that there is a relationship between 'knowledge' and 'problem solving ability'. Here, there exists two lines of thought: knowledge and problem solving ability are independent of one another; and the two are directly related, that problem solving ability is, in fact, knowledge.

The first view, according to Boshuizen and Claessen (1982), holds that there are universally applicable problem solving methods which, together with factual knowledge about a specific area, constitutes the determinants of one's success in solving problems relating to that area. From a tradition of intelligence research, cognitive psychology has long tried to study problem solving ability and problem solving behaviour in as pure a form as possible without the disturbing influence of individual differences in knowledge. The choice of problem types reflected this intention; Tower of Hanoi problems, match tricks, pitcher problems, all problems that require very little prior knowledge. The second view that knowledge and problem solving ability are directly related represents the more recent developments of cognitive psychology, that started with, for example, De Groot's (1946,1965) pioneer work on the thoughts of the chess player. De Groot concluded that the development in chess problem solving ability is not a matter of changed procedures or strategies; club players and grand masters follow the same procedures. It is not generally possible, De Groot writes, to distinguish the '*thinking aloud protocol*' of a grandmaster from the protocol of a less strong player solely on structural and/or formal grounds. The differences in thinking are of a



qualitative nature. De Groot is not yet very specific about the nature of these qualitative aspects of thinking, or about the differences in knowledge underlying them. Later writers (e.g. Elshout and Wielinga, 1979; Elshout, Frijda and Den Uyl, 1980) suggest that aside from an increase of mainly pre-reflexive knowledge, it is a matter of changed knowledge organisation of different things becoming important in the knowledge system, of developing different ways of gaining access to parts of one's knowledge, and of acquiring more knowledge about the application and applicability of one's theoretical knowledge.

The conclusion that can be drawn from this debate is that problem solving can be either knowledge dependent, or knowledge independent, or both depending on the context of the problem. This supports some of the notions that Schön postulates in his epistemology of practice, in which he points out that he believes that the professional deals with two kinds of knowledge, scientific (technical rationality) and non scientific which he refers to as theory in action resulting from reflection in action. It is possible, therefore, to suggest that problem-solving is not based solely on technical rationality, that is, the application of scientific knowledge, but that there also exists an element which does not reside within technical rationality, that is, non-instrumental.

Recent research on problem solving focuses on the relationships between knowledge modification and changes in problem solving behaviour; using problem types requiring little prior knowledge (e.g. Anzai and Simon, 1979), on becoming an expert on Tower of Hanoi problems, or requiring well defined prior knowledge (e.g. Bhaskar and Simon, 1977), on thermodynamics. The choice of these types of problems makes it possible to construct computer models of a person's entire (relevant) knowledge system, and of the development therein.

2. Heuristic and strategic knowledge.

Heuristics, according to Turner (1977) are orientating procedures which indicate some possible strategies for reaching a solution by trying schemes which have been useful before rather than trying them all. Heuristics, thus, are useful in a situation where a problem solver cannot identify the problem and has to transform or (re)structure parts of his or her conception of the problem in order to find a solution (Meijer and Frériersma, 1986). Heuristics in some sense are not knowledge specific and dependent on insights and understandings of a particular domain. Instead, they are procedures that are based on certain set of rules that determines how problems are dealt with. They are schemes that have been effective in similar situations and are not necessarily based on application of principles or constructs that underpin the domain involved. In other words, heuristics are not entirely based on applied scientific principles, and although they can be specified completely or less fully, Meijer and Frériersma warn that there is no certainty that the solution will follow. This debate brings in perspective Schön's (1983, 1987) 'theories in use' which are constructed in and through repeated exposure to real world situations.

3. Problem representation.

We use some form of mental representation which helps us not only store factual information, but also to direct and guide our actions on the basis of our world knowledge and our previous experience. Banyard and Hayes (1991) suggest that one of the ways that we store factual information is by classifying it into concepts, which allows us to handle much more information than we possibly could if we treated each new bit of information as if it were totally unique. Several different mechanisms have been suggested as to how we go about this

classification:

- The Associationist Models of concept formation refers to the linking of things by association, for example, things that belong to the same category, Hull (1943); things that show a kind of 'family resemblance' which might include usage, Rosch (1975);
- Schema is more than just a concept which represents factual information, According to Banyard and Hayes, (1991) it is also concerned with directing future courses of action and organising how we deal with it. Those schema, suggests Neisser (1976) are important in telling us how we should act in our environment. Neisser refers to 'anticipatory' schema which, he says, allows us to take our experiences into account in predicting what will occur next. For him cognition happens because we are active in the world and actively sampling it. Rumelhart (1980) suggests four ways of thinking about schema:
 - plays containing information about characters, setting and scripts for appropriate sequences of action.
 - theories which allow us to produce a meaningful explanation for what is happening around us.
 - computer systems allowing us to process information that we are receiving from the world.
 - decoders, breaking down and analysing the components of everyday living in the same way as a grammatical parser will break down a sentence into its grammatical parts and its meanings.
- Scripts - According to Schank and Abelson (1977), we live much of our everyday lives according to well defined and well understood scripts. These allow us to identify what is going on and to know how we should act in order to be socially acceptable.

Schank and Abelson have classified scripts into three types: **situational** involving social situations; **personal** involving expectations and behaviours; and **instrumental** involving targets and goals.

- Cognitive maps - 'mental picture', (Tolman, 1948). Human beings use cognitive maps frequently and researchers (Saarinen, 1973; Briggs, 1971), have shown how these maps often represent our personal involvement with the world.

In order to process information, one needs to encode external stimuli as internally coded representations. Essentially, claim Meijer and Fréiermersma(1986, p. 5), "problem solving can be conceived as transforming an initial problem conception to a final conception, of which the structure reveals the solution. We do not know what an internal representation looks like exactly. However, we can infer from differences in the problem solving behaviour of persons with different levels of expertise that experts tend to emphasize structural features while novices are prone to attend to superficial features".

Summary of Problem-Solving

The conclusion that can be drawn from the literature thus far suggests that much of what has been written about problem-solving results from investigations in cognitive psychology, (in the main), education, management, social work, medicine, accountancy, nursing, and so on, concerned with the ability of a person to reason, understand, solve problems and learn on the basis of these cognitive abilities. The accumulated knowledge following these investigations is likely to have lasting effects on improving and increasing the general use of these abilities.

There is, in my view, a link between competence and problem-solving in that both can be

perceived as a quality or state of being of an individual. In so far as the professional context is concerned, nursing being a case in point, the skills, judgements, values and abilities, such as, problem-solving, critical analysis, communication and so on, required for successful functioning are the attributes that bind competence to the role of the nurse. The ability to problem-solve, I would suggest, demonstrates competence at the point where this ability is required. It does not follow that to be competent at problem solving equates with being a competent nurse, it merely indicates that problem solving skill is a crucial attribute, among others, of the competent nurse.

Assessment Implications

If it is paramount that assessment tasks reflect what students will encounter in the real world and how they problem - solve, it is then important to consider the implications for assessment in the light of the above debate. Firstly, if competence, in its most simplistic form, is thought of as the capacity to perform successfully a series of discrete observable tasks, then assessment will likely consist of an observer simply ticking off a checklist of the discrete tasks. This approach to the assessment of competence, state Hager et al, (1994) has been widely criticised on the grounds that reducing an occupation to a series of observable tasks provides a trivial and superficial representation of the occupation.

Secondly, if competence relates to the possession of a series of desirable attributes such as knowledge of appropriate sorts, skills and abilities such as problem-solving, analysis, communication, pattern recognition and attitudes of appropriate kinds, then assessment can be perceived in terms of a strategy to assess each of the separate attributes. Hager et al, (1994), point out that this approach to the assessment of competence has been widely

criticised on the grounds that assessing attributes in isolation from actual work practice bears little relation to future occupational performance. They also point out that complex attributes such as problem - solving, analysis, pattern recognition are highly context dependent, but point out that attempts to teach them out of context are largely misconceived, without stating why or how.

Thirdly, if competence is perceived as an 'integrated conception' (Hager et al., 1994) where there is a link between tasks and general attributes, that is setting the performance of particular tasks into a context of general attributes; then argues Gonczi (1993), this is the only way in which competence-based assessment can remain anchored to the completion of vocational or occupation-specific tasks whilst meeting criticisms of the 'atomization' of learning and performance..

Fourthly, if it is agreed that competence is inferred from performance, Hager et al. (P. 5) suggest that this has the effect "of placing assessment of competence in the same situation as other kinds of assessment", that is, they are as objective as any alternatives as long as procedures available to maximise its validity and reliability are adhered to. Competence based assessment, in common with other types of assessment, involves inference that is subject to error. In all cases, suggest Hager et al. (1994) the way to proceed is to gather the kind of evidence that will make the inference safe, that is following available procedures that will ensure that inferences about competence are soundly based.

For Hager et al., the assessment of competence requires a myriad of strategies which combine observable tasks with the assessment of complex attributes, such as problem-solving, analysis, communication and attitudes of appropriate kinds. They refer to this approach as the

'integrated approach'. This, they argue, gets as close as possible to delineating what competence in an occupation actually consists of. They argue that competence standards based on the integrated approach can "reflect the actual richness of work, the use of knowledge in action and the intelligent judgement the hallmark of occupational competence. (p. 6)" The issue for Hager et al. is whether it is possible to measure what is described in integrated occupational competence standards. In their view there would be nothing about the nature of what is described in the integrated occupational competence standards that would prevent it being measured in principle. This belief is well supported by Wilmot et al. (1994) who view the competence-based system as related to criterion referencing where the performance of an individual is assessed against pre-established criteria. They point out that "judgements are based on evidence gathered from performances about whether or not an individual meets particular criteria. (p. 4)"

The conclusion that can be drawn from Hager et al.'s (1994) and Wilmot et al.'s (1994) discussion is that measurement of competence standards is possible. Do they, however, lend themselves to the differentiation needed in a selection process in a competitive environment? At its simplistic level, criterion referencing which leads to outcomes of *pass* or *not pass* or *can do* or *cannot do* can only be dealing with a concept of mastery and cannot therefore be dealing with differentiation, since the latter is dependent on outcomes that are described in terms of grades or degrees of mastery, (Nuttall, 1984; Peddie, 1992). To achieve differentiation, Wilmot et al. (p. 4) suggest that "if we are dealing with more general attributes and can accept a more continuous view of competence we shall be able to organise assessment so as to observe degrees of performance and will have much more scope for differentiated outcomes from the assessment." They also suggest that "we may also be able to determine attributes which characterise performance which goes beyond that required

simply to pass, and which would be recognised as meriting greater recognition. In doing this we have moved beyond the elementary concept of mastery. (p. 4)" The 'continuous view of competence' is an approach which is perceived as capable of satisfying the legitimate aspirations of students, that is, maximising student's performance, mastery of the basics and pursuance of excellence and creativity, (Byrne 1993).

How valid is an integrated approach (i.e. a range of assessments), to assessing competence?

Hager et al. are confident that the integrated approach, which involves a range of assessment strategies, is valid, since, they argue, (p. 6) "the nature of these integrated competence standards is such that there will be a greater emphasis on the application and synthesis of knowledge and an attempt to consider the role of other attributes in professional judgements." This, they suggest, would ultimately lead to, (p. 6) "a greater integration of the theoretical and practical" which is at the heart of successful professional practice. They also acknowledge that there will be instances where knowledge will be assessed by itself and unrelated to specific performance. They propose the following underlying principles to ensure validity.

- The more direct and relevant the assessment is to the performance being assessed, the more chance there is for it to measure what it is supposed to measure. Referring to medicine Hager et al suggest that patient diagnosis requires performance assessment, whereas interpretation of a pathology report can be assessed through questioning, thereby matching the forms and methods of assessment with the type of behaviour being assessed.
- The narrower the base of evidence for the inference of competence, the less

generalisable it will be to the performance of other tasks. Hager et al. (p. 7), posit, although cautiously, that "performance on paper and pencil tests in any profession will probably be too narrow a base for assessing overall occupational competence."

What is important for Hager et al. is that a range of assessments has to be used to provide evidence on which to infer overall competence since, they argue, no single test can achieve this. They recommend the following mix of assessment forms, as a possible means to achieve integration.

- *questioning techniques*: projects/assignments, problems, case studies;
- *simulations*: simulated patients, simulated work places, situational exercises;
- *skills test*: standardised patients, work samples, objective structured clinical examination;
- *direct observation*: supervisor evaluations, practice/professional year/internship/industrial experience;
- *evidence of prior learning*: portfolios, log books, qualifications, referees.

Such an approach, suggest Wilmut et al. (1994, p.11), would also interact directly with the mastery of processes which underpin competencies, since, they argue, the outcomes statements in a competence-based scheme cannot be met without due attention to process. What is being suggested here is the possibility of gaining access to the processes involved in undertaking a task, that is the cognitive and affective processes.

The link between performance and competence

Hager et al's. debate regarding competence-based assessment focuses on a mix of assessment forms which is needed to achieve integration; and the two sets of criteria which, they argue, must be fulfilled: the combination of theory and practice, and the simultaneous assessment of a number of elements.

The integrated approach, thus, lays emphasis on performances, on more direct evidence, and on a variety of evidence gathered through various means. If performance is central to competence based assessment, this would suggest that there is an inherent link between the two. What, then, is the link between competence and performance? Competence, according to Messick (1984), is what a person knows and can do under ideal circumstances. Or in the words of Newble (1992) what a person 'should be able to do at an expected level of achievement'. Performance, on the other hand is what is actually done under a given set of existing circumstances, that is, what is actually done in the real-life context. It would appear that the 'level of achievement', involving cognitive and affective attributes, is the factor that links performance with competence, since the quality and standard of the performance are the factors that would determine the degree or level of competence. Performance assessment, thus, is a key element of competence-based assessment.

The key characteristics of performance-based assessment.

Hager et al. point out that there are five key elements to the definition of competence - based assessment and they are as follows:

- Performance assessment is a process not a test.
- The focus of this process is data gathering.
- The data are gathered by means of systematic observation. The emphasis is on direct observation.
- The data are integrated for the purpose of making specific decisions that should guide the form and substance of the assessment and
- the subject of the decision making is the individual, usually an employee or a student, not a programme or product reflecting a group's activity.

Relevant as they appear to be, one of the criticisms that may be directed to those key characteristics is that they are so process oriented that they neglect specifying both general and specific outcomes that would enable assessors, students and interested third parties make reasonably objective judgements with respect to student achievement or non-achievement.

Writing about the National Vocational Qualifications, Wolf, (1994) indicates the importance of the following three components which define the practice of a competence-based assessment:

- The emphasis on outcomes - specifically, multiple outcomes, each distinctive and separately considered.
- The belief that these can and should be specified to the point where they are clear and transparent - that assessors, assessees and third parties should be able to understand what is being assessed and what should be achieved.
- The decoupling of assessment from particular institutions or learning programmes.

Wolf also points out that the emphasis on outcomes and transparency is not peculiar to the competence-based context as these are defining characteristics of a broader theory of measurement - criterion referencing. In her view, competence-based assessment, as employed by the vocational training, involves an idea of competence which is non-academic, it is vocational and bound up with the idea of real-life performance. This latter point may be true for vocational training, however, in so far as professional occupations are concerned, the idea of competence involves the knowledge, skills and attitudes relevant to the particular professional group, that is the values of the intellectual community. Wolf herself has indicated that viewing competence as a series of observable tasks implies a 'mechanistic and atomistic' approach to learning and has warned about the serious problem thrown up when tying measurement and accreditation to the notion of competence.

A range of assessments, including performance - based assessments are not confined to medicine and nursing. Accountancy, Law, Social Work and the National Veterinary Examinations have all made use of similar approaches, where practical performance has been assessed in simulated work places. A major part of performance - based assessment is already well understood and credentialed in assessment terms, (Berk, 1986), and there is little justification in rejecting their use on the basis of doubts relating to reliability and validity. This approach to assessment, claim Hager et al., is a better way of assessing knowledge than through traditional forms of assessment where the emphasis has been on recall and understanding mostly. They also indicate that candidates are put into situations in which they are required to comprehend, apply, analyse, synthesize and evaluate data and information.

Hager et al's. (1994) responses to the critics of the competence based movement relating to

the reliability and validity of integrated forms of assessment are summarised below:

- Occupational competence involves the establishment of a valid set of competency standards, thus fulfilling the criteria that 'any technically sound performance assessment procedure requires that there has been a thorough job analysis to serve as the corner stone for the assessment, (Gonczi et al, 1990; Heywood et al, 1992).
- Competence-based assessments assess a number of elements simultaneously.
- The higher level aspects of cognition, like synthesis and application, are less likely to be overlooked.
- The validity of such assessment is assured by the fact that an appropriate sample of actual work performance is the most direct basis for making such an assessment of professional competence.
- Empirical evidence is available which contradicts the view that professional judgement is less objective than other alternatives, (Van Der Vleuten et al., 1991; Norman et al., 1991).
- The integrated approach to competence provides a solution to the measurement of values and attitudes since attributes appear in the performance criteria for elements of the occupation. 'Empathising with the patient' is not difficult to assess in realistic work contexts where it is an important part of the performance of the element. What is difficult is assessing 'empathy' in the abstract. A major advantage of well-constructed competency standards of the integrated kind is that they facilitate the reliable assessment of attitudes and values.

There is little doubt about the potential of performance - based assessment, particularly in the domain of professional competence and especially for occupations where clinical competence

is perceived as the delivery of competent care of high quality.

The use of integrated approaches in nursing

To what extent has the integrated approach to assessment been used in nursing? Is there a need for further development of integrated methods? Evidence from the literature strongly indicates that the movement towards the integrated approach to assessment in nursing dates from around the 1970s, in both Britain and the United States, (Joint Board of Clinical Nursing Studies, 1974; Boreham, 1977; Adelman et al., 1977; De Tornay, 1968; Kratz, 1981; Mitchell et al., 1975).

In Britain the movement was pioneered by Boreham, 1977, with the development of case histories to assess nurses' ability to solve clinical problems. Boreham's test is based on the case history of a patient (suffering from acute renal failure following major trauma). It is set out as a series of episodes in the management of the case, each episode comprising a clinical vignette which contains all the essential information which a nurse is expected to understand, interpret and act upon if she were nursing the patient. Following each episode are questions which can be answered correctly by applying knowledge of the appropriate nursing procedures and principles to the specific occurrences described in the case history. Boreham's test saw the introduction of a written simulation test for the first time in Britain.

A historical review of literature on nurse education reveals that methods, devised to enable judgements to be made on the basis of information derived from a wide range of sources, including extended essays and assignments, projects and care studies, seminar papers, small scale research studies and practical assessments, are being used (Mazhindu, 1991). Writing

about the assessment of practical nursing skills, Aggleton et al. (1987) remark that there has been a shift from classroom based assessment, which was criticised for its artificiality to systems of continuous assessment which, by their cumulative nature, encourage learners to develop and reflect on their own experiences in response to a particular programme of study.

At the Challenge of Choice Conference held at St Bartholomew's School of Nursing in 1986, Labonté highlighted the problems of the then formal assessment system which placed a heavy reliance on the traditional forms of examination. Only a limited range of abilities was being assessed and attributes like creativity, problem-solving, collecting and analysing data, maintaining motivation and working steadily over a period of time were infrequently or never assessed. Labonté presented an assessment framework which incorporated a much wider range of abilities and attributes and based on a model characterised by participation, democracy, cooperation, interdependence, self improvement, knowing how and with emphasis on formative strategies.

What the literature in nursing appears to suggest is that nurse educationists are busy examining issues surrounding the assessment of professional competence. What is apparent, too, is the shift from traditional methods of assessment to strategies that are more in tune with the characteristics of the integrated approach (Hager et al., 1994), that is, knowledge in action, judgement based on problem-solving and setting the performance of particular tasks into a context of general attributes, (Gonczi, 1994); and greater emphasis on the application and synthesis of knowledge and an attempt to consider the role of other attributes, (attitudinal attributes), in professional judgements, (Hager et al 1994).

The integrated approach would no doubt help to address those pertinent notions that are

considered so important in Schön's epistemology of practice and what he perceives as professional artistry and competence. Schön's debate, I would argue, adds justification to Hager et al.'s (1994) recommendation of a mix of assessment forms that are integrated, (holistic).

The impetus for this perceived change results in part from the attempts at addressing the dichotomy between theory and practice which contributes to conflict between 'ideal' and 'real' (Bendall 1973) and in part from changes in health care and education emanating from Governmental policies of deinstitutionalisation, advances in health care technologies, introduction of new curricula in the light of Project 2000 proposals and the exponential growth rate of medical and nursing knowledge.

This study concerns a new assessment, the Problem Solving Case History Test, which forms part of a competence based assessment system for nurse education. One aim of this research is to establish whether the claim, that the PSCH puts candidates into situations in which they are required to comprehend, apply, analyse, synthesize and evaluate data and information, is fulfilled.

CHAPTER 4

LITERATURE REVIEW

INTEGRATED ASSESSMENTS AND SIMULATION TESTS

Introduction

The increasing disillusion with traditional assessment methods in professional courses and the growing interest in competence-based assessment have led to the development of assessment techniques that can evaluate a combination of attributes. Integrated assessment techniques, thus, have become the norm for assessing occupation competence, particularly for those professions where clinical competence is so crucial. What has become apparent, state Hager et al. (1994, p. 11), is that "clinical competence is a complex phenomenon, which almost always requires the practitioner to use a combination of attributes simultaneously, but, in addition, the practitioners need to adapt their practices to different contexts". In Hager et al's. opinion, it is not surprising that "no single assessment technique has been found which can evaluate overall clinical competence. (p. 11)" This suggests that the planned combination of techniques is the way forward.

Ideally, evidence should be collected from actual work practice, however, owing to such things as cost and time constraints, this is not always possible in every instance. The next best sources of evidence, thus, are those based on simulation of work practices, either through the use of clinical or written simulations.

This chapter considers some examples of integrated assessments that simulate the 'real-life' situation. Some consideration is given to the assessment and evaluation methods used to address the concerns surrounding the assessment of practice and the challenges faced by educators on account of validity and reliability issues raised.

Assessment Strategies: An Attempt to Integrate Theory and Practice

There are indicators within the literature as to possible assessment methods that may promote the integration of theory with practice. It is evident from the literature reviewed that effective nurse performance requires competence in the application of theory and skill in the clinical situation. The practitioner must therefore possess the necessary knowledge as well as having mastery in psychomotor, cognitive and affective skills. Investigating to what extent this is being achieved, however, has posed a challenge for several decades. A variety of approaches to measuring nurse performance have been explored and these can be classified as follows:

- ratings
- simulation design and
- actual situated behaviour.

Measurement of nurse performance by ratings.

There have been few studies involving the use of a rating process and the questionnaire, as the main recording device, has featured prominently in research of this kind. The studies, conducted in the United States, in the main, are somewhat dated, but still relevant. These have involved:

- Ratings by directors of nursing and/or nurses themselves; (Welches et al. 1974;

Hogstel, 1977; Howell, 1978; Zarett, 1980). The studies have involved the administration of similar questionnaires to directors of nursing; and nursing students (two or three cohorts) who have graduated from associate degree, baccalaureate and diploma programmes respectively. The main aim of the studies was to compare the performance of students from different programmes of studies. Findings suggest that baccalaureates were better prepared in some specified nursing functions than their associate degree colleagues (Hogstel, 1977); diploma nurses were rated significantly higher than baccalaureates in areas such as performing independently (Zarett, 1980); associate degree nurses were considered less proficient in their technical skills performance than their diploma and baccalaureate colleagues (Howell, 1978); and baccalaureates were considered to be significantly more skilled in their ability to apply knowledge concerning biopsychosocial influences on health status (Zarett, 1980). While et al. (1995) warn that the findings be considered with caution on account of methodological concerns regarding the poor response rate (40% in one study); lack of detail regarding the reliability and validity testing of tools; educational background of directors being unknown; and directors' ratings being biased towards their own educational background.

- Ratings by head nurses, (Tate, 1962; Welches et al. 1974; O'Brien, 1984; Bircumshaw, 1989). The studies involved head nurses using questionnaires to score subjects' performance. The head nurses have observed subjects' practice at close quarters and consequently may be considered to be a more reliable source of opinion. Results indicate the following: Welches' et al. (1974) found no correlation between the educational background of the staff nurses and the head nurse ratings but noted several limitations including evidence of the halo effect in the head nurses' rating and

their tendency to rate all participants generously; O'Brien (1984), a small scale rating study conducted in the United Kingdom found that ward sisters rated under-graduate nurses highly on their knowledge base and ability to assess and meet clients' needs; the reliability detractor was the ward sisters' limited experience of the graduates in comparison to conventional nurses.

- Ratings by head nurses and nurses themselves (Nelson, 1978; Schwirian et al. 1979; McCloskey, 1983). Nelson's (1978) study used a 35 item questionnaire and included graduates', (baccalaureates, associate degree and diploma nurses), self rating in addition to obtaining ratings of nurse performance from immediate supervisors. Analysis of data confirmed differences between the three groups - diplomates rated themselves significantly higher on overall performance while supervisors rated baccalaureates significantly higher overall and in technical, communicative and administrative skills. Schwirian's et al. (1979) study involved a 52 item questionnaire grouped into six subscales of nurse performance. The main findings indicated that associate degree nurses rated themselves lowest on all six subscales while the baccalaureates rated themselves highest; the employers' ratings indicated that baccalaureates were rated significantly higher than the associate degree and diploma groups; the response rate for the nurse group, however, was poor - 30.4%. McCloskey's (1983) study, involving a six dimension scale of nursing performance and a job effectiveness scale, found that nurses from the associate degree and diploma cohorts achieved higher mean job effectiveness scores than baccalaureates while head nurse ratings of subjects' performance revealed no differences between the groups.

A variety of conflicting findings have emerged from the rating studies. Associate degree

nurses have been considered less proficient in their performance of technical skills when compared with diplomates and baccalaureates. In contrast associate degree cohorts have achieved the highest mean score for job effectiveness (McCloskey, 1983). Other comparative studies have concluded that baccalaureates perform better or differently from other educationally prepared groups. The two UK studies (O'Brien, 1984; Bircumshaw, 1989) have indicated that undergraduates were considered favourably regarding their knowledge and practical skills. However, the results must be considered with caution in view of the criticisms noted, for example, lack of instrument development and reliability and validity testing, ineffective rater performance, small sample size, coupled with poor response rates and inappropriate data analysis. Furthermore, none of the studies have investigated actual performance in the practice setting.

Simulation as a measure of performance

Since the 1960s simulation has been used increasingly as a research method in studies of the problem-solving process. Rather than investigating nurse performance in real-life situation, several researchers have explored the possibility of measuring this concept in a simulated environment. Simulation refers to the representation of elements of social or physical reality in order to facilitate a clearer understanding of an actual situation (Duke, 1986). It has been extensively used as a research technique in medical education (Sherman et al. 1979; Rethans and Van Boven, 1987) and its use by nurse researchers has increased over recent years (Del Bueno, 1983, Tanner et al. 1987; Padrick, 1990; Roberts et al. 1995; While et al. 1995)

The advantages of simulation as an evaluation tool have been well documented (Roberts et

al. 1992). To summarise, the advantages of simulation as a research method include: the potential to provide the standard against which performance can be judged; allowing for the control of extraneous variables in the real life situation and facilitating the measurement of skill in a specific task. Thus the fragmentation of the behaviour under analysis is avoided and the validity of the test purporting to measure performance is enhanced (While et al. 1995).

The simulation studies have been grouped thus:

- Problem-Solving
- Information-Seeking studies

Writing about problem-solving studies as a measure of nurse performance, While et al. (1995) indicate that several studies have adopted a simulation design to assess cognitive aspects of nurse performance. These include the use of films, videotaped or written simulations. For example, in Verhonick et al.'s (1968) study participants (n=1965) observed 5 filmed patient situations and recorded their observations, plan for action and rationale. Results showed that the highest frequency of relevant observations increased with each higher degree held and, further, the participants were more likely to relate supportive actions to observations made. In While et al.'s. (1995) study a non-representative sample and failure to discuss the validity of the tool prevent generalisations being drawn.

De Tornyay, (1967, 1968), was one of the first to use written simulations in nursing education. She developed the Clinical Nursing Problem Test to measure problem solving skills in nursing students and her work draws heavily upon an earlier model devised by McGuire and Babbott (1967). The simulated clinical nursing problems, involving a patient in cardiac care, comprised of a number of sections each of which contains relevant and irrelevant information from which the student has to choose. The results of test scores

indicate that students who had been prepared in discovery learning exceeded those with didactic teaching in their problem solving scores. Reviewing the literature, While et al. (1995) draw attention on the limitations of De Tornyay's study, they indicate that validity is opened to question as the content was only reviewed by one qualified nurse and a physician. The reliability of the test was also questionable, the test-re-test (four weeks interval) yielded a reliability co-efficient for the net score of 0.57 for the Efficiency Index, and 0.55 for the Proficiency Index on the Pearson Product-Moment Correlation Test. The special problem of estimating reliability with this type of unconventional test was acknowledged by De Tornyay and reference was also made to the small sample size.

Further work was undertaken by McIntyre et al, (1972); Munro, (1982); Sherman et al. (1979) who again drew heavily upon the model devised by McGuire and Babbott (1967). McIntyre et al.'s (1972) study involved baccalaureate nursing students. Their simulation instrument sampled a variety of decision making behaviours, and allowed for expedient as well as unnecessary or harmful alternatives, and placed real demands on the student's ability to problem solve. No detail is provided regarding the construction of the tool and reliability and validity measures. Munro's, (1982), study used a set of three written simulations of family health. Each simulation presented a problem situation consisting a series of alphabetically identified sections with a visible set of stimulus items and a concealed or latent set of corresponding "response" items. Munro's study indicated that individual differences in problem solving competency and or style can be separately measured, differences identified and improved strategies learned. She also claimed that it was also possible to analyse the patterns and strategies of problem-solving, but does not provide any detail regarding the process used. Sherman et al. (1979) developed a patient management problem

(PMP) to assess problem-solving. Students ($n=9$) were presented with a simulated problem and asked to solve specific problems through a series of inquiries, decisions and actions. In an attempt to measure instrument validity and reliability, scores were correlated with the scores obtained on a multiple choice test, however, no meaningful relationships were found. A co-efficient of 0.49 was obtained when the scores of proficiency and competency were compared with students' scores in undertaking a nursing history six months prior to taking the PMP. A number of subsequent studies have explored the validity and reliability of the PMP as a research tool (Farrand et al. 1981, 1982; Holzemer and McLaughlin, 1988). All emphasized the complexity of the PMP as an exercise and the difficulty of drawing meaningful conclusions from any results. McGuire and Babott (1967) suggest that the experienced and efficient problem-solver will solve the PMP with the minimum information necessary for that particular problem. The contextual nature of problem-solving within the clinical area led While et al. (1995) to conclude that further research is needed before it can be claimed that the PMP is a valid measure of nurses' problem-solving skills.

In Britain, Boreham (1977) used the case histories method and based the test on a patient suffering from acute renal failure following major trauma. The test is set out as a series of episodes in the management of the case, each episode comprising a clinical vignette which contains all the essential information which a nurse would be expected to understand, interpret and act upon if she were nursing that patient. Following each episode are questions which can only be answered correctly by applying knowledge of the appropriate nursing procedures and principles to the specific occurrences described in the case history. To investigate the use of this method of assessment, Boreham developed a case history test using formative evaluation, defined by Bloom, (1971), as the process of improving educational

procedures by evaluating them whilst they are still being developed. Boreham's study involved a variety of draft papers given to students in several hospitals. When they had answered the papers, there was a general discussion involving the students, Clinical Teacher, Tutor and the researcher. He was interested in how the students arrived at their answers, and whether the test problem simulated real life problems in the ward. He found that many typical clinical events made poor test stimuli. In fact, what he found was that simulated cues worked best as test stimuli when they are to some extent unreal. Unusual reactions to drugs, unrealistic constraints on the availability of equipment, and a more than normal occurrence of complications are all valuable for generating items which will test students' ability to put their knowledge to use. In an attempt to measure instrument reliability and validity Boreham also used a parallel test of recall for comparison purposes. The latter comprised short answer questions on the same topic as the case history test. He randomly divided the students into two groups. One group took the case history test and the other group the recall test. Following testing, Boreham conducted a debriefing session which, (p. 62) "aimed to elicit the mental skills by which the students had responded to the test questions." The data gathered to ascertain whether the students had been "applying" or "recalling" clearly indicated, he states, (p. 62) "that the case history test required students to make judgements more like those that might be required in the ward than did the recall test." However, Boreham openly admits that the data collected in the study is essentially qualitative and does not lend itself to statistical analysis.

Much of the research in nursing has used some type of simulation to stimulate the thinking processes of subjects. Padrick's (1990) study made a comparison of the thinking processes stimulated by simulations and those used in actual practice. The purpose of this investigation

was to compare the decision making processes that hospice nurses used on simulations with those used in practice. The variables used to measure decision making were: the initial approach used in making the decision; whether or not the appropriate alternatives were considered; the information reporting strategy; and the overall approach used. The situation variables which may explain differences were: the complexity of the situation; the degree to which the subject felt engaged with the patient; the difficulty that the subject felt making the decision; and the uncertainty that the subject had in recalling the practice situation. Verbal protocols were collected from a convenience sample of 34 hospice nurses on three written simulations and on three clinical situations in which they made a decision about the patient's pain control regimen. Subjects were interviewed in one or two sessions which were tape recorded and transcribed for analysis. Content analysis of the verbal protocols highlighted four major findings from the study. First, there was no difference between practice and simulation on the initial approach. Second, there were significant differences between practice and simulation on the alternatives considered, the reporting strategy and the overall approach. Third, the situation variables did not account for much of the variance of the process variables. Fourth, there were no differences between different levels of education on the process variables. Although statistical data are not available for scrutiny, the findings from this study have implications for nursing, especially future research on clinical decision making. If there is a difference between practice and simulation on decision making processes used, then more research on clinical decision making should be conducted in practice. Findings from simulations may not be generalizable to practice. However, further research should be conducted to determine if the differences between simulation and practice is replicable.

Information seeking studies

Tests exploring the information seeking process amongst nurses have proved difficult to construct, validate and evaluate (Hurst, 1985). Different methodologies have been used including verbal protocol techniques (Tanner et al. 1987; Jones, 1989; Grobe et al. 1991), the cue and card sort (Hammond et al. 1966, Openshaw, 1985) as well as a variety of simulation techniques (McGuire and Babbott, 1967; Sherman et al. 1979; Farrand et al. 1981; Tanner, 1982). Studies have in the main exploited one of three simulation techniques: written simulation exercises such as the Patient Management Problem (McGuire and Babbott, 1967; Sherman et al. 1979; Farrand et al. 1982; Holzemer and McLaughlin, 1988), video-tape simulation exercises (Verhonick et al. 1968; Davis, 1972; Tanner et al. 1987) and computer-based simulation exercises (Holden and Klinger, 1988).

The patient management problem (PMP) has already been considered (see section on simulation as a measure of nurse performance). Findings of the study undertaken by Hammond et al. (1966) were considered to be inconclusive showing variability of strategy components, utilisation coefficients and performance across cases. Subsequent studies (Farrand et al., 1982; Holzemer and McLaughlin, 1988) have all emphasised the complexity of the PMP as an exercise and the difficulty of drawing meaningful conclusions from any results.

Video-tape simulations. The use of video-tape simulations in research exploring problem-solving has a long history (Verhonick et al. 1968, Tanner et al. 1987). Tanner et al. (1987) conducted a comparative study of cognitive strategies used by junior nursing students (n=13),

senior nursing students (n=13) and practising nurses (n=15). Verbal responses to three vignettes preceded by a verbal change-of-shift report provided the data. After listening to the report and viewing the video-tapes participants were asked to recount their thoughts. Participants were subsequently asked to seek information from the researcher that would be obtained in actual practice and continue to ask questions until they had obtained sufficient information to identify major problems and decide upon appropriate management strategies. Hypotheses activation was scored in terms of the number of accurate and possible hypotheses generated and the time taken to activate a diagnostic hypothesis. Data acquisition was scored as the number of questions subjects asked coupled with the rating of predominant strategies used. This showed data acquisition strategies similar to those identified in the medical literature: hypothesis testing, symptom exploration and a review of the systems approach (Gale and Marsden, 1982; Kassirer et al. 1982). Such findings are consistent with other studies that suggest more experienced practitioners are increasingly focused and systematic in data acquisition than those who are less experienced (Roberts et al. 1993, 1996).

The most recent British study, Roberts (2000) adopted a two phase simulation design to explore and compare the problem-solving skills of senior students. A key objective was an exploration of the care planning skills of students (n=253), all in the final three months of their course, from three programmes of preparation (RGN, Diploma RN and Integrated Degree programmes). The methods used included a written simulation exercise employed to explore data acquisition skills and a video-tape simulation exercise designed to explore care planning skills. An elderly client situation was chosen and the scenario depicted an interaction between nurse and client in the form of an admission assessment interview. This exercise afforded the opportunity to explore a situation commonly experienced by nurses in

practice. Prior to viewing the video-tape scenario, each participant was given a set of paperwork, consisting of local nursing history forms; a blank sheet of A4 paper; and a blank nursing care plan,. After viewing the video-tape, participants were given 30 minutes in which to formulate a care plan. Results indicate a large range in the global care plan scores with the Integrated degree programme participants achieving the highest scores and diploma RN programme participants the lowest. There was also a significant difference between the scores of the three programmes of preparation between the integrated degree and diploma programmes and between the integrated degree and the RGN programmes. However, there was no significant difference between the diploma RN and RGN programmes participants. While the study findings are of interest, Roberts (2000) indicates that these must be examined in the context of the methodological limitations of the study as the low subsection alpha coefficients (Cronbach's $r=0.65$) indicate the need for future tool modification. Roberts (2000) holds the view that further extensive research is required regarding the validity and reliability of simulation before the potential of this research method can be fully exploited.

Computer based simulations: Holden and Klinger (1988) explored the effects of nurse education and experience upon the problem-solving process. The sample consisted of nursing students in the first term ($n=26$), final year students ($n=29$), paediatric nurses ($n=30$) and a group of students who were also parents ($n=15$). Two computer presented simulations formed the basis for data collection: the 'cry problem' and 'insomnia problem', the latter acted as control. Two sub-tasks were also included: searching for relevant facts from twenty five information units and determining the single correct hypothesis from among nine hypotheses. Findings revealed the number of information units sought prior to problem-solving. All four groups found the 'cry problem' easier to solve with 30% of the parent group requiring only

five or fewer information units. The study identified differences in the type of strategies adopted in information seeking. The experienced nurses were likely to use a simultaneous information-seeking strategy and use a state attribute approach (Gorden, 1980) than were student nurses who tended to use successive information acquisition approach and focus more on the contextual attributes than the crying infant. The limitations acknowledged by the authors related to problems inherent within the software, limitations of the 'insomnia problem' as a control and limited control of background variables.

In their review of the literature, While et al. (1995) indicate that the empirical work on information seeking reveals the complex nature of the task and the methodological difficulties inherent in any attempt to explore information-seeking behaviours, especially issues of sample size and validity which are consistent across methodologies.

The Objective Structured Clinical Examinations as a Measure of Clinical Skills Measurement (OSCE).

Like a simulation approach the OSCE is also administered within a laboratory setting. It was originally designed for use in medical education and its potential as a measurement of clinical skills performance has also been explored in nursing (McKnight et al. 1987; Ross et al., 1988; Reed, 1992). These are flexible examinations comprising a circuit of 5 to 15 minutes patient stations. This method assesses a candidate's skills, attitudes and knowledge through the undertaking of a variety of tasks, such as history taking, physical examination, data interpretation, specimen handling, emergency procedure. The students rotate through a series of timed stations, where, for instance they may be asked to perform a clinical skill or they

may be required to complete a focused patient health assessment or teach a patient in a health promotion setting. An examiner observes the students at the examiner station and scores their performance using a prepared checklist. Occasionally standardised patients are used to present a patient profile to the student. At marker stations, students are asked to respond to questions by writing short answers, or to analyse or interpret data. The number of stations in an OSCE circuit usually ranges from 10 to 17, but any number can be included as appropriate. The amount of time taken to complete each station is about four to five minutes, including 30 seconds for moving on to the next station. The purported advantages of this method include the use of a pre-determined checklist of criterion items for rating and a specified level of assessment which minimises ambiguity thereby facilitating inter-rater reliability. In a report by Reed (1992) low correlations across testing stations has been highlighted as a problem thus preventing any prediction being made regarding subjects' performance in practice.

Direct observation of nurse performance

Very few studies have been located in the literature which adopt an observational approach. The ones that have some relevance to the measurement of nursing performance are those conducted by Christman (1971); Waters et al, (1972) and Bircumshaw and Chapman (1988). Christman (1971) used the Slater Scale (Slater, 1967) to observe baccalaureate nurses' performance. The organisation of nursing care (patient allocation versus task allocation) was the independent variable and results indicated a statistical significant difference ($p < 0.05$) between performance score and setting. The mean score for those working in a patient-centred setting (4.1) was significantly higher than for those working in a task-allocation

environment (3.7). Walters et al (1972) found differences between associate nurses (n=24) who were predominantly practical in practice, where actions had a physiological basis and baccalaureates (n=24) who demonstrated a more professional approach placing greater emphasis on clients' psychological and social needs. More recently, Bircumshaw and Chapman (1988) incorporated an observational approach in their study which compared the practice style of graduate, non-graduate and midwives in Wales. The pilot phase included several instruments: attitude questionnaire, card sort and observation of practice using an activity analysis approach. Potential differences between the groups were indicated, although the researchers concluded that activity analysis produced little useful observational data and required modification. It should be noted that the main studies findings were not reported.

Other forms of assessment

There has been much discussion about the use of reflection, an essential skill in nursing, especially in relation to the work of Schön (1991); Benner, (1984); Palmer et al. (1994); Reed and Proctor (1995). However the notion of reflective practice can be problematic as it is not always clear as to its purpose, what practitioners should reflect upon and how and when they might undertake it (Clarke et al. 1996). Clarke et al. (1996) suggest that more consideration be given to clarifying the nature of nursing practice and the contribution reflection might make to its development. This view is echoed by Jarvis (1992) who views reflective practice as more than just thoughtful practice, but as a process of "turning thoughtful practice into a potential learning situation in practice, in what must always be a situation of probability" (p. 178). As part of this move toward a more reflexive approach to learning, there has been the development of the professional diary, logbook or portfolio as a means of assisting this

process. The ENB (1995), in revisiting its guidelines and regulations on assessment, introduced the development of the learning portfolio as a requirement of educational programmes. Similarly, the UKCC now requires all practitioners to maintain a professional profile detailing their on-going professional development as a precondition of continuing registration (UKCC, 1994).

There is some literature on the use of learning portfolios in nursing and midwifery education, but some conflicting views exist as to how it might contribute to the assessment of practice. Some authors advocate the use of portfolios in the summative assessment of practice. Jasper (1995), for example, describes the use of a portfolio workbook within a shortened Diploma in Higher Education programme for graduates, covering all aspects of the programme, not just clinical practice. The impetus behind this development seems to have been to structure the focus of students' learning to facilitate their completion of the Common Foundation Programme in a shorter time than normally required. The portfolio was subjected to formative and summative assessment with grading on a 10-point scale according to a set of level criteria.

Supporting the use of portfolios to assess students' performance, Gerrish (1993) indicates that the wide range of evidence that can be included within portfolios is regarded as an advantage in the assessment process by both students and teachers. However, Patterson (1995) questions the appropriateness of their use for formally assessing performance, making the point that students' reflective accounts of practice should be seen as confidential, and as teaching and learning tools rather than as a means of assessment. The concern is that reflection will not be open and honest if assessment is involved. This is an issue to which there is no simple

answer, highlighting the difficulty of using such indirect strategy to assess practice, although, Wong et al. (1995) showed that it was possible to construct a coding scheme to enable staff to assess the level of student reflection from reflective journals. The study report concludes that although it is difficult to identify finer levels of reflective activity, it is possible to identify students as non-reflectors, reflectors, and critical reflectors with some reliability; and that analysis of journal content to categorise the more complex aspects of reflection, proved more difficult (p. 56). Wong et al. (1995) believe that they have established an appropriate procedure for research of this type, through the use of independent judges and determination of reliability.

On the whole, portfolios with their associated norms of ipsative reference, negotiation and participation form a loose and untested constellation of innovative projects which are becoming integral components of pre and post registration courses. Glen and Hight (1992) advocate the persistence of the use of portfolios in assessing performance on account of the challenge they pose to the separation of assessment and the curriculum because they are based on dialogue between student and educator. Dialogue has clear merits in educational terms in reminding students that learning is a two way process.

Conclusion

The literature suggests that there is a failure to agree on methods which can adequately measure competence. Qualitative measures have been criticised as reductionist or task orientated and qualitative measures accused of lacking both definition and transferability between institutions. Some of the limitations of the rating competence have been highlighted

by Benner (1982), who argues that where competence assessment stresses the functional characteristics of a job, any ability to differentiate between the nurse with functional skills and one with deeper personal perceptions is lost. Birkemshaw (1989) suggests that such fundamental aspects of competence as caring, interpersonal interaction and decision making are concepts which cannot easily be measured quantitatively and recommends greater use of qualitative approaches. However, Chappel and Hager (1994) who support the use of measurable competence standards, advocate the development of an integrated approach, incorporating the measurement of performance, emotions, values and knowledge in context.

The emergence of degree and latterly Project 2000 training has led to research on the differences in the competence and performance of nurses. UK studies have advocated a more qualitative approach to assessment of competence , in contrast to the US reliance on quantitative measures, which have been criticised for being reductionist (Benner, 1984). This may explain the focus away, in Britain, from rating scales and tests, towards phenomenology, as advocated by Girot (1993) and multiple assessments such as those employed by While et al (1995).

There is evidence of a range of assessment methods operating in nursing, but most of the material is descriptive, with a paucity of evaluative articles. Consequently, as Sharp et al. (1995) point out “there are many tools to assess competency which are currently in use in nursing education without any clear rationale for their implementation” (p. 33).

Roberts et al. (1993) argue that the development of problem-solving skills requires a higher profile in current nurse education programmes if the nursing profession is to meet the

challenges of the next decade. The search for valid and reliable methods of both developing and measuring such skills merits further empirical study. If within the nursing profession reflective practice is to be encouraged and competence accurately measured, then, argue Roberts et al. (1992) innovative teaching and evaluation strategies can no longer be eschewed. A review of the literature would suggest that the potential role of simulation in such a process merits further exploration. Roberts et al. (1992) argue that simulation exercises have a valuable role to play since a sound method of assessment of competence to practice has yet to emerge. They go on to point out that “in the present climate of tight time schedules, full curricula and limited clinical supervision, the use of simulations as a means of developing students’ psycho-motor skills requires further research. Equally significant is the role simulation may play in helping develop those integrative skills (Heath, 1983) which form the basis of reflective practice” (p. 413). The potential of simulations as an educational strategy is clearly enormous, it will, however, require further research and an increased familiarisation with simulation techniques before it is fully realised in nurse education.

CHAPTER 5**THE PROBLEM-SOLVING CASE HISTORY****Introduction.**

As indicated previously, the assessment of nursing students has been under attack. Assessment practices have failed to meet the most important requirements of sound assessment in that they do not measure the main skills of students, but instead focus on simple recall of information. There has been a drive for nurse educationists to design assessments which will provide good quality information about students' performance without the distortion of good teaching practice. Furthermore, there has been a push to foster higher order skills including application of knowledge, investigation, reasoning, analysing and interpretation, which the assessment system is expected to encourage and support. There has, therefore, been a need for a new assessment approach which will help to address some of the issues raised in the literature review relating to the assessment of professional competence, the fostering of higher order skills and reflective practice.

At St Bartholomew School of Nursing and Midwifery, the need for innovations in assessment was prompted in part by the curriculum reform movement which influenced nursing education in the late 1970s, and in part by the need for assessments to be closely linked to the totality of the curriculum and to be more aligned with life as this relates to the work environment. In addition, the impetus for change was brought about in response to Studdy's (1985) survey of the assessment system for the pre-registration course which revealed that a limited range of abilities was being assessed.

The Curriculum Assessment Working Group.

My involvement in curriculum planning and assessment development at St Bartholomew started in late 1983 shortly after I had taken post as Senior Tutor. I became a member of the Curriculum Assessment Working Group, (CAWG), which was set up in April 1983 in response to the dissatisfaction with the assessment system that was in current use. In the main, teachers were concerned that the assessment system as a whole did not reflect current thinking in education or indeed the move to a problem-solving approach as witnessed in patient care. The assessment system needed to be reviewed.

The CAWG's terms of reference were to:

- Review the assessment system in order to identify the strengths and weaknesses of the existing arrangements.
- Develop and recommend to the school a new assessment system.
- Assist with the implementation, monitoring and evaluation of the new system.

In devising a system of assessment for the pre-registration course, the group was guided by the following sets of principles.

- It was felt that assessment is a worthwhile activity that has standards and criteria immanent in it, and that teachers, clinicians and students engage in. We were concerned to ensure that nurse education and training took place within an environment which was mutually supportive for students, teachers and trained staff, - all those involved in the assessment of the student.
- The assessment system should provide all those involved with the opportunity to

reflect upon and monitor progress throughout the process of assessment. In particular, it was vital that the students be given the opportunity to develop their ability to monitor their own progress towards an acceptable level of professional competence. With this goal in mind the aim was to facilitate constructive educational dialogue among all parties involved.

- The task of assessment is that of improving students' capacity to work to such criteria by critical reaction to work done. In this sense, then, the aim was to facilitate the teaching of self-assessment.
- The tasks used to assess what students know and can do need to reflect the tasks they will encounter in the real world and should reveal how students go about solving problems. What a student can do is not necessarily an index of what a student will do, and it is what a student will do that matters in the clinical environment. The aim was to develop assessment tasks that provide activities that resemble in significant ways the challenges that nurses encounter in the course of their work.
- To obviate the need for the assessment of skills and theoretical knowledge to be conducted separately, we had hoped to develop the system so that both skills and knowledge and attitudes would be considered as unified rather than separate elements. One of the overriding aims in nursing education is to bridge the gap that exists between practice and theory. We had envisaged that the assessment system may contribute to this aim. The aim was to develop theoretical assessment in synchronization with practical assessment.
- The assessment strategy should include a mix of assessment forms that would contribute to the overall profile of theoretical and practical performance and progress and professional conduct. It was our aim to use an 'holistic approach', for the

assessment of professional competence, that is, to seek ways to assess skills, knowledge and attitudes simultaneously. To this end, the following mix of assessments was chosen:

- direct observation of work activities,
- skills tests as part of the continuing clinical assessment
- projects and assignments
- clinical simulation exercises in the form of 'Objective Structured Clinical Examination'
- care diaries
- record of achievement and
- written simulation test.

In brief, our aim was to develop a professionally relevant system of assessment. In identifying key elements within this, we were initially guided by the United Kingdom Central Council's (1983) nurses' Training Rules which advocate the use of problem solving and skills based approaches to nursing care in which assessment, planning, implementation and evaluation become key elements within the process of nursing. These four aspects of the nursing process (Yura and Walsh 1967; Marriner 1979) would, we hoped, forge links between the educative and the practice-based aspects of the types of nursing care likely to be encountered by students.

I played a key role in chairing the sub-group responsible for the development of written simulation assessment. This role in the main was to facilitate the group's activities. My first task involved setting up the group, which consisted of one student, one clinical teacher, two

clinical staff, (one from the medical area and the other from a surgical area), a lecturer and myself. This range of membership was important as the central feature of this kind of assessment relates to what the nurse would do in practice. Our task involved the following:

1. Analyse the available literature.
2. Identify the key features of written simulation assessments.
3. Devise the assessment format/s.
4. Produce assessment materials.

Throughout the production of test materials, the group was also engaged in checking the materials for face validity, content validity and reliability. By face validity is meant the extent to which the items appear to have relevance and meaning to those who will use it. The checking of face validity was undertaken by a panel of experts comprising of clinicians and educators whose expertise lies in the area being focused on in the written simulation test. For example, if the test depicts aspects relating to surgical nursing, experts relating to surgical nursing would be called upon to check face validity. Content validity, on the other hand, refers to the extent to which assessment items sample relevant forms of behaviour. A grid, (see appendix 1), was devised and this guided the development of test items. The grid specifies that all the competencies expected of a registered nurse (as stated in Rule 18(1) of Approval Order 1983) must be tested by the PSCH test. Finally, assessment materials of this type are considered to be reliable when there is a high level of agreement between judges using them, therefore, advice relating to reliability was sought from the panel of experts.

The written simulation test devised was titled the Problem Solving Case History. A set of guidelines for constructing the PSCH was developed, (see appendix 2), and this guided the

item-writing group on how the actual tasks were to be written and the number of items to be included in each test. The guidelines also specified the mix of cognitive levels and how the questions should be worded in order that each cognitive level could be appropriately tested. Four different tests were devised which took into consideration the experience, knowledge and the student's stage of training/education. These tests were trialled on eight cohorts of students. Meetings were then organised and these enabled feedback regarding the test appearance; the wording of scenarios, vignettes and test items; the test structure; levels of cognitive ability; testing of competency; the time it took to complete the test; and issues arising from test administration and when making judgement relating to pass or fail criteria. The feedback informed the development of the PSCH test and what follows is a description of the test format which was devised to test the suitability of the student to be placed on the professional register and is the subject of this study. I was the main contributor in its development. I devised the main structure of this assessment and facilitated the production of materials.

The Problem Solving Case History Test.

The problem - solving case history format consists of a series of nursing and medical histories of a small group of patients, (up to six), followed by a series of ten questions, set at different levels of cognitive ability, (see below), about each patient and the overall management of the care of the group. It attempts to sample more clinically relevant cognitive skills than the traditional essay or short answer questions.

The test is based on the care management of a group of patients during a span of duty, usually

during a shift of duty, either morning, afternoon or night. The test moves the student along a time span. In each sequence a clinical vignette is given about one of the six patients included in the history, and a question is asked to test one particular level of cognitive ability. That is, either application, selection or formulation or all three together. Recall is tested at the same time as higher cognitive levels are tested, this is based on the rationale that application of knowledge or principles depends primarily on correct recall of knowledge or principles, (Rowntree, 1977). Of the ten questions set, three test for application, three for selection and the remaining four test for formulation and solving problem by selecting, generating and applying facts and principles.

The problem solving case history, (PSCH), involves the following principles:

A story line, this should include the type of ward, span of duty, deployment of other ward staff, the number of patients involved in the care group, the status of the person being examined and who s/he is working with. The following is an example:

"Elmslie ward is a mixed ward consisting of 17 male and 15 female beds. The ward caters for both medical and surgical patients. You are a staff nurse on early duty with sister, 1 staff nurse, 1 enrolled nurse and 3 student nurses. You are looking after the following patients with student nurse Preece who is in her first year of training. Nurse Preece is half - way through her placement and has recently successfully attempted Part A, (Aseptic Technique), of her

practical assessment.

This is then followed by profiles of four to six patients giving an idea of:

A range of:- dependencies
 Length of stay
 Problems, (symptoms, needs
 diagnoses).
 Forthcoming events.

Each patient to have: name

age
 enough detail of problem
 and management and
 statement of current status.

In addition one may have an empty bed, or admission or discharge. The following is an example:

Mrs Alice Bates, aged 70 years, was admitted yesterday with the diagnosis of Broncho - Pneumonia. She is described by her neighbours as a recluse who is reluctant to mix with the local community. Her neighbours informed the Police when they realised they had not seen her for several days and were unable to get a reply. Mrs Bates was found in

neglected surroundings and obviously ill. The doctor has ordered bed rest, intravenous infusion, antibiotics, physiotherapy and oxygen therapy. She is still finding it difficult to breathe and she seems confused."

The problem solving case history involves ten questions across a time span to include:

assessment

planning and organisation of work

teaching

promotion of health and prevention of ill health

reorganisation following events, (some events viewed or described as emergencies).

evaluation of care.

The test has been designed so that each question stands alone and each succeeding question does not invalidate a previous answer. Measures are taken to ensure that the succeeding question does not depend on information to be received later. Each question may be preceded by a clinical vignette which contains all the essential information which a nurse would be expected to understand, interpret and act upon if s/he were nursing the patient.

The ten questions are set at different levels of cognitive ability and are based on Rowntree's (1977) schema of cognitive skills. Rowntree's schema is an adaptation of Bloom et al.'s (1971) taxonomy of cognitive objectives which Rowntree broadly classifies as two categories: knowledge, which is referred to as *class 1* and intellectual abilities and

skills, referred to as *class 2-6*. Bloom's taxonomy arranges classes of objectives in order from simple to complex, with the underlying principle that objectives at any one level build upon objectives at lower level. The taxonomy has six main classes and each class is capable of further sub-division:

1. Knowledge: ability to remember facts, terms, definitions, methods, rules, principles, etc.
2. Comprehension: ability to translate ideas from one form into another, to interpret, and to extrapolate consequences, trends, etc.
3. Application: ability to use general rules and principles in particular situations.
4. Analysis: ability to break down an artefact and make clear the nature of its component parts and the relationship between them.
5. Synthesis: ability to arrange and assemble various elements so as to make a new statement or plan or conclusion - a 'unique communication'.
6. Evaluation: ability to judge the value of materials or methods in terms of internal accuracy and consistency or by comparison with external criteria.

Rowntree's contention with Bloom's taxonomy is that it is linear, has too many inconsistencies and incoherences. Rowntree, (1977, p. 104) states that "it is not always obvious that later classes build on or incorporate earlier ones: can't one evaluate, say, a work of art without being able to 'synthesize' such a work oneself? Can't one synthesize before being able to analyse or even comprehend what one is doing at the time?" Rowntree points out that it seems possible that earlier classes sometimes depend on a later one, which he perceives as the reverse of the taxonomy's explicit intention.

Thus, he says, some types of comprehension might incorporate elements of application or analysis and some kinds of application are only possible through synthesis. He warns, (p. 105) that the taxonomy should not be regarded as "comprehensive, prescriptive and indubitable", but rather as "suggestive, illuminative and stimulating". His criticism of Bloom's taxonomy relates mainly to the latter's failure to clarify the fine distinctions among the higher processes. He suggests that clearer distinctions may be made possible if grounded in 'a specific content'.

As an alternative to Bloom's taxonomy, Rowntree offers a schema which, although described as 'coarse-grained', is useful in "thinking about levels in relation to any particular content area". It was this later observation that prompted the use of Rowntree's schema as a basis for the development of this written simulation. Rowntree's schema, (p. 106), identifies four distinct levels: Recall, Application, Selection and Formulation.

- Recalling facts and principles (*cognitive level 1*), (e.g. What is X?).
- Applying a given or recalled fact or principle (*cognitive level 2*), (e.g. How does X help you solve this problem?). Application relates to the ability to use rules and general principles in particular situations.
- Selecting and applying facts and principles, (*from all that you know*) to solve problems (*cognitive level 3*), (e.g. What do you know that will help you solve this problem?). Selecting is the ability to make choices from a number of possible options.
- Formulating and solving own problems by selecting, generating and applying facts and principles (*cognitive level 4*), (e.g. What do I see as the problem here and how

can I reach a satisfactory solution?). This cognitive level goes beyond application and selection. It requires the production or creation of solutions or ideas rather than the recognition of appropriate relationships, products or judgements. At level 4, says Rowntree, "the student makes his own meanings within his structure of ideas rather than performing tricks with other people's meaning." This points to elements of creativity, analysis, synthesis, judgement and evaluation. He further points out that formulation may be associated with expressive objectives, (process objectives), which, he says, "manifest themselves in the personal and idiosyncratic performance of the student".

The view that knowledge and problem-solving are directly related, (De Groot, 1946,1965), justifies the use of a framework of cognitive skills in the construction of an assessment. This, I believe, enables the test constructor to make explicit the constructs that are being tested, a step in ensuring the validity of the instrument. Rowntree's schema, it would appear, provides such a framework since the assessment constructs can be specified in advance, more or less precisely. By assessment constructs, Rowntree means "the qualities and abilities and traits we are looking for in students". He suggests the use of constructs rather than goals since the later is too purposeful a word.

One of Rowntree's chief contentions with regard to assessment relates to stating goals or objectives, since, explicitness in statement of what should be achieved, often leads to one missing out other qualities that are equally important. Rowntree conveys an ideology about assessment which suggests that we seek to understand ourselves and others and that we might interpret this activity as a manifestation of a basic need to come to know and

to understand our social world so that we may adapt to it. Rowntree, it would appear, supports the 'holistic' (Gonczi, 1994) view of assessment, where general attributes are perceived to be as important as specific abilities. Rowntree points out, (p. 92), although cautiously and with some reservation, that "giving thought to objectives is essential if assessment is to be relevant and worthwhile", but warns that, in so doing, that one does not solely concentrate on the content objectives (those related to knowledge) and lose sight of what he calls process objectives, that is 'life skills' and methodological objectives. Life-skills objectives are those referred to as "the enhanced capacity and inclination for thought, action and feeling among students", whereas methodological objectives, are perceived as:

"cognitive, affective and psychomotor processes the student engages in and develops that can reasonably be held to be peculiar to the subject matter he is investigating: the differing methods of framing problems, the differing forms of investigation, the differing kinds of response to experience, the differing criteria to proof and truth, the differing modes of explanation and justification. I am talking here not of the concepts peculiar to various subject matter areas but of the ways of generating and manipulating such concepts that are distinctive of that subject matter and not to be easily categorized as special applications of general useful abilities."

Rowntree, 1977. p: 97-98.

The distinction between 'life-skills' and 'methodological' objectives are minimal and are conveniently referred to as 'process' objectives - the process that makes possible the establishment of knowledge. According to Bruner, (1964), we teach a subject not to produce little living libraries on the subject, rather, to get a student to think for himself, to consider matters as a historian does, to embody the process of knowledge-getting. Knowing is a process, not a product. Rowntree's concern is that any assessment should embody the process of knowing besides getting the student to reveal what he knows. This

ideology is reflected in his schema of cognitive skills, which, to all intent and purposes, appears to be in tune with Gonczi's (1994) holistic view of assessment.

If Rowntree's assertion regarding the association of formulation with expressive/process objectives is true, then one can reasonably assume that the schema would be an appropriate framework to evaluate Schön's notion of problem-solving which does not rest on scientific knowledge, but rather on non-technical processes. If formulation, as pointed by Rowntree, enables the student to make his/her own meanings within one's structure of ideas, Rowntree's schema should be perceived as flexible enough to provide insight into how practitioners resolve conflicting situations, a means to establish whether the later falls outside the model of technical rationality or if it is dependent on scientific knowledge, (instrumental problem-solving).

Since expressive/process objectives manifest themselves in the personal and idiosyncratic performance of the student, then the later's 'overall approach' when dealing with some underlying domain may be evaluated, suggesting insight regarding the 'holistic' view of competence. On this basis, one can reasonably conclude that Rowntree's schema is an appropriate framework as an integrated approach in assessment since the lower levels of cognition could test the occupation's specific tasks, 'atomistic components' and the higher order skills the 'holistic' components. Given this line of reasoning, it would be appropriate to suggest that the Problem-Solving Case History is capable of evaluating the lower and higher order cognitive skills; and help with inferential judgement regarding Ellis's (1988) notion of competence, which refers to unobservable attributes, capacities, dispositions, attitudes and values. Naturally, how well the PSCH is capable at evaluating

all the characteristics discussed above is subject to investigation. The assumption is that it can, what this study seeks is some evidence that it does. Answers are sought to such questions as “how reliable and valid is the Problem-Solving Case History test in assessing problem solving and professional competence?” Only research can provide these answers particularly at a time when the profession is seeking realistic means of evaluating attributes that determine attainment of professional competence.

CHAPTER 6**METHODOLOGY****JUSTIFICATION FOR CHOICE OF RESEARCH APPROACH****Introduction:**

The main thrust of this study relates to the validation of the PSCH which focuses on the following:

- Does the PSCH test problem-solving skills?
- Can the PSCH be used as a measure of professional competence?
- Does the PSCH simulate the 'real-life' situation or event?
- How reliable is the judgement made by markers of students' performance?
- What are the issues that concern the subjects involved in the implementation of the PSCH?

The Problem Solving Case History is a test and therefore we need to look at the assessment literature to decide how best to evaluate it. Some consideration, therefore, needs to be given to assessment paradigms, since these will determine the appropriateness or inappropriateness of the approach used to validate the test. A paradigm is a set of interrelated concepts which provide the framework within which we see and understand a particular problem or activity, (Gipps 1994). How the PSCH will be evaluated will, therefore, be determined by the assessment paradigm which it relates to.

Assessment Paradigms

There are two models of assessment: the psychometric and the educational assessment

models.

The **traditional psychometric model** of testing sorts people in predetermined categories. Technical issues, such as standardisation, reliability and limited dimensionality appear to be of primary importance. The model requires that tests are carried out in the same way, marked in the same way and scores interpreted in the same way. Most critics agree that psychometrics have nothing to say about students/pupils themselves, only where they stand in relation to each other on some hypothetical scale - that is, interpreted in relation to norms. The psychometric model conveys a notion of limitation, (Gipps, 1994) which is now perceived to be a major disadvantage and is also considered to be an unfair approach for looking at individuals' educational performance. According to Gipps, (1994), the aura of objectivity which comes with psychometric theory and its formulae and quantification makes such testing to be perceived as scientific and that figures produced must, accordingly, be accurate and meaningful.

The educational assessment model, in contrast with psychometrics, focuses on assessments which look at the individual as an individual rather than in relation to other individuals; and to use measurement constructively to identify strengths and weaknesses individuals might have so as to aid their educational progress (Gipps, 1994).

Wood (1986, p. 237) states that the differentiation of educational from psychological measurement has been made "in terms of the function or purpose of measurement, and the consequences for the individual of the act of measurement". He claims that differentiation ought to be made "in terms of the data the two kinds of measurement produced and the

methods of analysis which are appropriate for treating each". He argues that a powerful reason why educational measurement should not be based on psychometric theory is that the performances or traits being assessed have different properties: "achievement data arise as a direct result of instruction and are therefore crucially affected by teaching and teachers", (p. 237). He claims that aptitude and intelligence are traits which are unaffected by such factors. Thus, achievement data is 'dirty' compared with aptitude data and should not/cannot be analysed using models which do not allow for some sort of teaching effects. In drawing the distinction between the two models of measurement, Wood states that educational measurement:

- 1 deals with the individual's achievement relative to himself rather than to others;
- 2 seeks to test for competence rather than for intelligence;
- 3 takes place in relatively uncontrolled conditions and so does not produce 'well-behaved' data;
- 4 looks for best rather than 'typical' performances;
- 5 is most effective when rules and regulations characteristics of standardized testing are relaxed;
- 6 embodies a constructive outlook on assessment where the aim is to help rather than sentence the individual.

(Wood, 1986, p. 194)

Implications of the paradigm shift

The quest for elaborated procedures has resulted in a shift in assessment practices, from

psychometrics to educational assessment, from a testing culture to an assessment culture which integrates assessment with learning. Given this perceived shift, what are the implications for research involving evaluation studies in assessment? Are experimental paradigms appropriate or is there a call for an alternative approach which advocates a more responsive and flexible strategy? This shift has a parallel in the experimental versus naturalistic evaluation paradigm. The move is towards qualitative approaches which Eisner (1993) ascribes to the general dissatisfaction with education and its outcomes and a realization that standards will not be raised by having tough assessment policies. It is improving the quality of teaching and what goes on in schools that will raise standards, claims Eisner.

Evaluation within the constructivist and naturalistic paradigms rejects the traditional criteria of reliability, validity and generalizability and looks instead for qualities such as trustworthiness and authenticity (Guba and Lincoln, 1989). This, claims Gipps, requires us to reconceptualize the concepts of reliability and generalizability in relation to assessment. Her view is that assessment is developing a wider meaning and it is sometimes important to represent student's broad range of achievement (qualitative form of assessment) for a full understanding of what it is students know, understand and can do and in what contexts.

Trustworthiness, according to Guba and Lincoln is based on *credibility, transferability and dependability*. *Credibility* comes from regular on-going assessment in the classroom. Persistent observation brings depth to the study. This is the parallel construct to internal validity and the goal is to demonstrate that the enquiry was carried out in a way which ensures that the subject of the enquiry was accurately identified and described.

Transferability may replace the notion of generalizability: Gipps indicates that it is the provision of extensive information about the sending context, which allows transferability to be made - the more the sending and receiving contexts are alike the more likely is transfer. *Dependability* replaces traditional reliability, it is related to the process of assessment and the judgements made which must be open to scrutiny - (the audit process Guba and Lincoln, 1989). *Authenticity* is to do with the extent to which the relevant constructs (and this means all the stakeholders' constructs) are fairly and adequately covered in the assessment, the fairness aspect of authenticity suggests that all groups' constructs are included rather than just the test developers.

What can be concluded from the discussion, so far, is that the psychometric model lays emphasis on individual differences, fiercely rigorous administration procedures defended in the name of fairness and that educational measurement is concerned with content overriding statistical considerations, and an acceptance of techniques of assessment, notably teacher assessment, which palpably cannot meet psychometric desiderata (Wood 1986). Given the assessment paradigm underpinning the design of the PSCH, what model of evaluation is appropriate? This requires a consideration of what this assessment is for.

The purposes of the problem solving case history.

As previously indicated, the PSCH is a written simulation which has been designed to test the problem solving ability of nursing students. The overall purpose of simulations is to present a life-like situation to the subjects, approximating the real environment. Typically simulations are used to present subjects with a problem task from a real life situation, with

the subject being required to decide what actions they are going to take, based on the information presented. They are also required to articulate the rationales for the actions taken. Its aim to model the real-life situation, places written simulations in the same league as performance assessment which is defined as “ a systematic attempt to measure a learner’s ability to use previously acquired knowledge in solving novel problems or completing specific tasks. In performance assessment, real-life or simulated assessment exercises are used to elicit original responses, which are directly observed and rated by a qualified judge” (Stiggins and Bridgeford, 1982, p. 1).

In so far as the PSCH is concerned, I believe there are two main purposes to this assessment. First, it concerns the teaching/learning process. I envisaged that the test would provide teachers with the opportunity to analyse patterns and strategies of problem solving in their students. The aim here is to enable teachers to provide students with meaningful comments on their strengths and weaknesses relating to a series of desirable attributes that is problem solving, (recall, application, selection, formulation), analysis, communication and attitudes of appropriate kinds. I have indicated previously that the PSCH is related to what the nurse would do in practice, thus, the assumption is that students would be provided with additional opportunities to practise and improve their strategies following feedback on how they have performed. This is based on the notion that insight regarding strengths and weaknesses motivates students towards making improvements in their performance.

The second purpose of this assessment relates to certification and accountability. The public needs to be assured of the quality of professional education that the nurse has received. The public’s interest is safeguarded statutorily by the various mechanisms provided through the

functioning of the statutory bodies governing the education, training and registration of nurses; the agencies involved in the employment of nurses, (hospitals, community and private agencies); and the pressure groups concerned with voicing the needs of patients. It is expected that the practitioner will practise as a competent professional; is qualified to do so; is able to provide care that is of an acceptable standard and is able to maintain the expected standard. The mandate to practise is statutorily regulated and the bodies responsible for the maintenance of the appropriate register are accountable to the Government. The students, thus, have to satisfy both the statutory bodies; the employing agencies and other agencies with a stake in nurse education, of their competence to practise. The students have to demonstrate their capabilities and there is a heavy reliance on professional judgement in the evaluation of the response.

During the time that nurse examinations were centrally controlled, testing for accountability purposes had essentially been the traditional large scale testing, the objective multiple choice test, and short answer questions, for example. Since the devolution of the assessment system, there has been a move away from the use of large scale testing to tests that are performance based. Performance based assessment, (the PSCH being a case in point), valuable as they are to support learning, are increasingly being used for accountability purposes, particularly in occupations that are practice based, (nursing, medicine, physiotherapy etc.). Their use for accountability purposes has been found to be problematic (Frechtling, 1991), since they have emerged from research in subject matter learning, rather than as a result of psychometric test development. Given the impact of this style of testing on teaching and learning practice, Gipps (1994) states that it is important to see in what circumstances performance assessment can be used for large scale testing. She indicates that the technical aspects of performance

based assessment are interesting in themselves given the relatively new nature of this mode of assessment, but claims that they are brought in sharp focus by any attempt to use them for high stakes purposes.

Validity

The focus of performance based assessment is in measuring higher-order thinking skills in a context that mirrors the instructional process. These higher-order skills include the ability to formulate hypotheses, to seek alternatives, and to make judgements, as well as metacognitive skills such as planning, monitoring and controlling one's own problem solving strategies. These skills are processes that are necessary for effective reasoning and solving complex problems. Although cognitive psychologists largely agree that more general reasoning skills can and must be taught (Sternberg, 1987), the measurement of process skills is not a simple task. The focus in performance assessment relates to a shift to internal mental processes, which are not directly observable (Gott, 1987), rather than external behaviours.

According to Gipps (1994, p. 100) "performance assessment is important in educational assessment terms for what it offers by way of enhanced validity and the opportunity to assess higher order skills; the idea is that both construct and consequential validity are high". She points out that there is a tendency for good 'face validity', that is, the appearance that it is assessing the specified tasks. There is however some criticism about inadequate attention to construct validity and inadequate definition of the domain. The usage of the term 'construct validity' relates to 'a unitary conception' (Messick, 1989), which refers to the appropriateness, meaningfulness, and usefulness of the specific inferences made from test

scores; and the social consequences of testing. Messick's argument is that social values and social consequences cannot be ignored in consideration of validity. The unified view, then, must include both empirical and judgemental (value) appraisal of test scores in both a theoretical context of implied relevance and utility and in a value context of implied means and ends, (Messick, 1984). Consequential validity, indicates Gipps, (1994, p.101), "is an important issue for performance-based assessment given the promises being made by its advocates: that such tasks can be a faithful reflection of intended and important learning outcomes, and can encourage a tendency to direct teaching towards higher order skills and processes." She, however, warns that this intention can be subverted by practice on the task, which would contribute to transforming higher order tasks into rote tasks. She adds that this can be prevented by encouraging teachers to teach to the domain or sub-domain rather than the task.

The linking of performance-based assessment with instruction highlights the importance of consequential validity by emphasizing the interplay of the assessment and instructional environment, (Miller and Legg, 1993). Two recent frameworks for the validation of performance-based assessment include the interaction of assessment and instruction. Linn et al. (1991) suggest eight criteria that need to be studied for 'serious validation': intended and unintended consequences of test use, fairness, transfer and generalisability, cognitive complexity, content quality, content coverage, meaningfulness and cost and efficiency. Quellmalz (1991) has suggested six criteria: significance, fidelity, generalizability, developmental appropriateness, accessibility and utility. The sets of criteria proposed have proven helpful in identifying issues which deserve attention in validation, and in clarifying how specific concerns relate to the more global issues of construct under-representation and

construct irrelevant variance (Messick, 1989, 1994) which are potential threats to construct validity. In 'construct under-representation', the test is too narrow and fails to include important dimensions or facets of the construct. In 'construct-irrelevant variance' (*surplus construct irrelevancy*), the test depends on knowledge or skills from outside of that domain.

Haertel (1992, p. 987) argues that “test representation must be qualified to the extent that the test fails to sample some parts of the performance domain it is supposed to represent (construct under representation) or depends on knowledge or skills from outside of that domain, (construct-irrelevant variance)”. He goes on to say that construct validity might be informed by studies of the internal structure of test responses and suggests the use of think aloud protocols to examine solution approaches or post-examination interviews to probe perceptions of task requirements.

Content validity of performance measures, thus, is important to the extent that the test is taken to represent performance across some larger domain. Haertel indicates that where feasible, “test design should be guided by a clear and sensible specification of that performance domain, possibly informed by job analyses to identify important elements or dimensions of performance”, (p. 987). There is a cautionary warning in Haertel’s advice since a precise definition of criteria may be very difficult unless the task is limited and standardised. Furthermore, the more precise the limitation and standardisation to ensure comparability of scores, the less likely the task will represent a realistic, complex problem, (Miller and Legg, 1993). One solution, suggested by Haertel, is to use many brief exercises that sample the domain rather than a few lengthy ones. Gott (1987) cautions that these sampled exercises must not be done at the componential level, or we simply repeat the

instructional mistake of teaching complex skills as a collection of discrete parts rather than as an integrated process. To adopt this approach would be to reduce competence to its simplistic view which is mechanistic and atomistic in its approach to performance.

The conclusion that can be drawn from the above discussion is that both construct and consequential validity are particularly important for performance assessment on account of the opportunity they offer to assess higher order skills. To assess construct validity this study uses the 'think aloud' protocol to probe the perceptions of task requirements involved in a written simulation, the Problem Solving Case History. This is based on the notion that construct validity might be informed by studies of the internal structure of test responses, (Haertel, 1992). The think aloud protocol may also provide some indication of how faithful the PSCH is in reflecting the intended and important learning outcomes. To get at consequential validity semi-structured interviewing of clinicians and teachers is used to establish if students are better able at problem-solving.

Reliability

Traditionally, reliability has been defined as the accuracy and consistency of measurement. A test is considered consistent if it ranks the individual in the same position on successive administrations. Reliability is defined more precisely as the "degree to which scores are free from errors of measurement", (APA, 1985, p. 19). These errors come from unwanted variation, (anxiety, fear, effort, guessing etc.), which lowers the test's reliability and, in turn, lessens faith in the observed score. Classical reliability theory assumes that every observed score that is delivered by an assessment is made up of a true score and an error. The

reliability of the assessment is then defined as the ratio of the true-score variance to the observed-score variance. The reliability of a test, as defined, "is a concept which cannot be directly observed" claims Cronbach, (1947, p. 2), so indirect estimates have to be made. This is usually done by obtaining two sets of results for each individual. These can be from the same test administered twice (reliability as stability), from the odd and even numbered questions in the same test ('split-half' reliability), from two matched tests (classical parallel forms), or from two tests randomly sampled from the same domain (random parallel forms). There is also consistency of marking to be considered: agreement between raters on the same assessment task (inter-rater reliability) and agreement of the same rater's judgements on different occasions (intra-rater reliability).

The classical derivation of reliability has been strongly criticised on the grounds that the definitions are circular (true score is defined in terms of parallel forms which are in turn defined in terms of true scores) and that the assumptions are too rarely met in practice for the theory to be relevant. Classical reliability theory has particularly unfortunate consequences when used in criterion-referenced assessment systems (Popham and Husek, 1969). Reformulation of the notion of reliability is necessary for tests that belong within the educational assessment paradigm.

Reliability is a fundamental concern in the valid interpretation of any kind of assessment. Of particular importance to performance based assessments is consistency across content (tasks) and raters. A performance test, states Haertel (1992 p. 987)), "is likely to be most highly predictive of performance in situations that closely resemble the test itself". It is therefore useful to begin any consideration of the reliability or replicability of any assessment by asking

what domain of performance the given measurement is intended to represent.

Generalizability theory (Cronbach, Gleser, Nanda, and Rajaratnam, 1972) offers a conceptual framework and a set of analytical tools for framing and addressing such questions. However, generalizability theory has been found to be problematic in performance based assessments, (Dunbar, Koretz and Hoover, 1991). On the whole results have shown a high degree of task-specific variance, (Dunbar, Koretz and Hoover, 1991; Shavelson, Baxter and Pine, 1991; Breland et al. 1987; Legg, 1987). We cannot, therefore, take performance on one task to imply that the student can do other tasks in the domain. This task specificity, claims Gipps (1994, p. 105) “is compounded by limited sampling from a domain and the difficulty then of generalizing from the performance to the whole domain”. To overcome these problems, Linn (1993) argues that we should increase the number of tasks and ensure comprehensive coverage of the domain in order to improve generalizability. Linn justifies his position on the grounds that the assessment task itself is a useful part of instruction.

The degree of generalizability possible, in performance based assessment, appears to be influenced by two aspects: the extent to which tasks share comparable features and the type of instruction received by students. The issues are clarified by Haertel (1993) in terms of the following four levels:

- first, replicable scoring of a single performance (can we score a single instance of a task in a consistent way?)
- second, replicability of a specific task (does the same performance task have a constant meaning across times and place?). Haertel indicates that this depends on three factors: Task administration involving rules about collaboration, coaching and

time allocation; the role of ancillary abilities in successful performance on the task (construct-irrelevant variance); and antecedent instruction which requires the transfer or application of something familiar into something new.

- third, generalizability across tasks which are presumed to be assessing the same construct (can we generalize across parallel tasks?). This is also dependent on ancillary abilities and antecedent instruction. The conclusion drawn by Haertel is that it is difficult to make two tasks to function the same way.
- fourth, generalizability across heterogeneous task domains (can we generalize across tasks that are not parallel?). All evidence suggests that this is highly unlikely since research in cognitive psychology and cross cultural studies have shown that expertise is domain specific and that variations in context greatly influence performance.

What can be concluded, from the above discussion, is that if we wish to generalize across domains, we are left with a serious question of coverage. Is this possible for assessments that are built on a model which is not that of psychometrics? Given the task specificity of performance assessment, can we estimate and predict future performance? Not so, according to Moss (1992) who proposes the use of interpretative research tradition rather than the psychometric tradition. Such an epistemological approach, it appears, would place subjects' and users' interpretations of the value of the test at the forefront in any evaluation of a test's validity. What is important, claims Gipps (1994) is not to standardize performance assessment to such an extent to achieve reliability that validity and attention to higher order skills are compromised, but rather to carefully specify the domain with mapping of performance assessment tasks on to it, so that it is clear what the tasks are assessing.

Inter-rater reliability is also an issue in performance based assessment since the scoring procedure is reliant on professional judgements which are usually subjective. Studies carried out recently, (Dunbar, Koretz and Hoover, 1991 and Linn, 1993a) indicate that inter-rater agreement can be high on performance assessment tasks but that this has to be achieved through careful training of raters and the provision of scoring rubrics. If the task is relatively straightforward, as for writing assessment based on a single topic and a specific mode, rater reliability can be quite high (Breland et al., 1987). However Haertel claims that attaining high reliability in scoring appears to be a major limitation that becomes increasingly difficult with the increased task complexity needed for greater authenticity. Clearly, the more realistic the assessment, the more difficult it is to derive reliable scores that accurately represent student achievement.

The weight of evidence reviewed by Linn and Dunbar et al., indicates that score reliability, is generally low, lower than rater reliability and resistant to being raised. The reason for this is due to the task specificity of performance assessment which leads to variability in performance even on different tasks that appear similar from the same domain. However there is some evidence that increasing the number of tasks tends to increase the score reliability more than does increasing the number of raters. Issues of score reliability is compounded by the fact that different methods of assessment (observation, notebook, computer simulation) provide different insights into what students know and can do.

Evaluating Validity and Reliability in the PSCH

The conclusion that can be drawn from the foregoing discussion is that increasing the number

of tasks in performance assessment will enhance generalizability and increase score reliability. What the discussion also highlights is the inappropriateness of using the psychometric model in evaluating assessments that have been developed from an instructional educational model. The suggestion by Moss (1992) to use the interpretative research approach appears to be credible and is highly relevant for the evaluation of the Problem Solving Case History Test, since the latter appears to satisfy all the criteria relating to performance based assessments. What is left to consider are the methods that would be deemed appropriate for its evaluation.

As indicated before, the PSCH was developed from within an instructional educational model. It aims at individual educational performance and seeks to understand how students perform when confronted with a novel problem or situation. In addition, in seeking to test for competence, it focuses on achievement data which is 'dirty' as a result of the 'rumpled reality' which the novel situation portrays. Its focus relates to internal mental processes, it aims to test for problem-solving, a psychological construct which is multidimensional, thus the attributes it seeks to test are multidimensional, that is the higher order skills, (for example, recall, application, selection and formulation), as well as metacognitive skills (such as planning, monitoring, etc.). Furthermore, in attempting to test for competence, there is an assumption that the tasks are a faithful reflection of intended and important learning outcomes suggesting the importance of the domain and sub-domains involved, that is all the appropriate professional knowledge, skills and attitudes.

The aim of this study is to provide information, comment, and analysis designed to increase knowledge and understanding of the innovation under review, that is the PSCH. The study

has been "custom built" and the initial strategies have been chosen in accord with the issues that arose out of the debate surrounding educational measurement. Therefore, the approach adopted for the evaluation is based on alternative forms of evaluation, called 'illuminative' (Parlett and Hamilton, 1972), 'holistic' (MacDonald, 1973), or 'responsive' (Stake, 1972), which all have in common a number of themes, including:

- responsive to the needs and perspectives of differing audiences;
- illuminative of the complex organisational, teaching and learning processes at issue;
- relevant to public and professional decisions forthcoming; and
- reported in language which is accessible to their audiences.

(Simons, 1972. p.5)

This study uses both qualitative and quantitative approaches in the **evaluation and validation** of an innovation in the assessment of student nurses. The primary purpose of both qualitative and quantitative approaches is the same in that both aim to contribute knowledge about the innovation - the Problem-Solving Case History Test, (PSCH). The essential difference between them are, amongst other things, that quantitative methods rely heavily, as their title implies, on acquiring data that is numerical and can be statistically interpreted. Qualitative methods are primarily concerned with in-depth study of human phenomena in order to understand their nature and the meanings they have for individuals involved.

The qualitative element is based on "evaluation as illumination", (Parlett and Hamilton, 1972). This is a multi-method approach to evaluation that lays stress on the need for careful description and reporting, interpretation and analysis, and is especially appropriate where

comparative and statistical studies are inapplicable. My task is not to come down definitively in favour of, or against, the particular innovative scheme being studied, but rather to elucidate and clarify a number of related issues that have to do with the operation of the scheme in practice, its philosophy, its perceived advantages and disadvantages, and its intended and unintended consequences. It aims to provide information and insight for a wide audience of interested parties. The open technique offered by the illuminative approach was considered the most appropriate for this part of the study. Illuminative evaluation, states Parlett and Dearden (1977) is clearly interventionistic in that,

“it promotes changes in the way people view educational processes. However researchers are not engaged in ‘action research’ in the usual sense. Generally investigators stop short of making outright policy recommendations, especially when these recommendations advance the views of one interest group over those of others. The quality of practice, and effectiveness of decision making processes and administration, can be improved by challenging conventional assumptions, disentangling complexities usually left in a muddle, isolating the most significant processes, and generally by raising consciousness and the level of discussion, illuminative evaluation provokes thought and unsettles established ways of thinking.”

Parlett and Dearden (1977) pp. 34/35.

The evaluation gives consideration to the views of subjects involved with and affected by the innovation, namely lecturers and students. The lecturers' involvement centers on implementing the change, marking and making judgement regarding students' performance. The students were directly affected by the innovation, since they were the ones subjected to educational assessment and examination. Views of clinical staff were also sought regarding students' handling of problem solving within the framework of the nursing process

The quantitative element relates to the studies done on consistency of marking. This involved intra-rater and inter-rater reliability studies and is based on traditional psychometric approaches.

To summarise, the study centers on both construct and consequential validity and reliability of marking. The aim of this study is to establish:

- Whether students engage themselves in problem solving activities, (the intended and important learning outcomes), whilst undertaking the written simulation test. This aspect of the study relies heavily on the qualitative approach engaging subjects in 'thought verbalisation', (construct validity).
- How useful it is as a tool in reinforcing the students' problem solving abilities in the work environment. This part of the study is qualitative and involves semi-structured interviewing of clinicians and teachers, (consequential validity).
- How consistent the marking is by lecturers. This part of the study involves a quantitative approach mainly. This is much more in the traditional model of evaluating assessments.

The Research Methods

A brief summary of the methods used is given in this chapter. A more detailed description of the various 'field-works' and the theoretical underpinnings, will accompany each chapter.

Accommodating the social dynamic nature of nursing practice and the various aspects of knowledge involved necessitated a broad ranging but robust and highly focused research strategy. The approach developed does not fit within any one research tradition or paradigm, such as the experimental, or naturalistic paradigm (Robson, 1993). It is neither a typically qualitative or quantitative approach as it involves a degree of control which is unusual in qualitative studies and a degree of naturalism alien to quantitative research (Wasoff and Dobash, 1992). The prime concerns of this study were to develop an approach which was robust and appropriate to the research questions. Conformity to a particular research approach or epistemological viewpoint was not the key issue.

Methodological non-conformity is not unusual in the real world of applied research (Robson, 1993). Bryman (1988) argues that while some research problems are best served by a 'scientific' quantitative approach and others by a qualitative naturalistic study, there are "still others [which] will be even better served by a marriage of the two traditions" (p. 173). The research approach developed for this study is just such a marriage. However, the qualitative tradition might be described as the dominant partner in the marriage for the following reasons. Firstly, a strong emphasis was placed on grounding the research in the realities of the day to day nursing practice and on understanding the nature of that practice. Secondly, the principle of openness was central to the study design. This openness partly stems from the unknown nature of the research territory. The scale of the investigative challenge suggested that a variety of methods was required to gather the relevant data. Robson acknowledges the added time and effort associated with the use of multiple methods, but strongly advocates their use for 'real world' research (Robson, 1993). In other words, complex problems may require complex approaches.

The methods used included thought verbalisation, semi-structured interviewing, questionnaires and statistical testing relating to reliability of marking. Information was further supplemented by the minutes of the committees and boards involved in curriculum planning and development, including assessment and examination, these being in the main, the Curriculum Assessment Working Group and the Examination Board. All the information was collected over a period spanning approximately three years from 1991 to 1994. The data collection period commenced in December 1991 and spanned the whole of 1992 and 1993 and a part of 1994. The field work relating to thought verbalisation was intensive and of short duration, all others were spread out over longer periods.

The following chart provides an overview of the study. Brief summaries are provided on the research methods chosen and the rationale for their choice.

Figure 6.1

AN OVERVIEW OF THE RESEARCH UNDERTAKEN IN THE EVALUATION OF THE P.S.C.H TEST					
RESEARCH QUESTIONS	RESEARCH METHODS	RATIONALE FOR CHOICE OF METHOD	SAMPLE SIZE	SUBJECTS INVOLVED	TIME SCALE
Does the PSCH test problem-solving skills?	Thought Verbalisation	'Think-aloud' involves investigating the processes used by students in carrying out the tasks set in the PSCH. This is an approach to study the construct validity of performance assessment.	8	Student Nurses approaching the end of their 3 year pre-registration course	(TA) December 1991 to January 1992
Can the PSCH be used as a measure of professional competence?	Thought Verbalisation Questionnaire Semi-structured Interviews	Competence refers to the product of education, training or other experiences. This range of research strategies would, it is hoped, provide different perspectives regarding the test's use in the measurement of professional competence.	126	8 Student Nurses (T.A) 98 Student Nurses 10 Lecturers 10 Clinicians	Semi-structured interviews of lecturers June 1992 to September 1992
Does the PSCH simulate the 'real-life' situation or event?	Questionnaire Semi-structured Interviews	Evaluation focuses on professionals' and student nurses' perception of the test	118	98 Student Nurses 10 Lecturers 10 Clinicians	Questionnaire involving 98 students: May 1992 to October 1993
How reliable is the judgement made by markers of students' performance?	Intra-rater study Inter-rater study	The marking process relies heavily on professional judgment. This evaluation focuses on inter and intra-judge consistency.	10	10 Lecturers	Intra and Inter-rater study May 1993 to December 1993
What are the issues that concern the subjects involved in the implementation of the PSCH?	Questionnaire Semi-structured Interviews	Evaluation focuses on the meanings the test has for different audiences. Its perceived advantages and disadvantages and its intended and unintended consequences.	118	98 Student Nurses 10 Lecturers 10 Clinicians	Study involving clinicians June 1993 to January 1994

Thought Verbalisation

In the study, 8 student nurses approaching the end of their pre-registration course were involved in 'thought verbalisation', a technique based upon an information processing model, (Newell and Simon 1972, Ericsson and Simon 1980), that views the activities that make up mental events as reflecting a flow of information. The subjects were asked to "talk aloud" whilst performing cognitive tasks.

Semi-structured Interviews

The semi-structured interview involved 10 experienced lecturers, all qualified teachers with special insight in the use of the PSCH Test and, were practising nurses prior to taking on the role of teachers of nurses; and 10 nurses from a range of clinical environments used for the clinical placement of pre-registered students. In order to assess the impact of the innovation it was necessary to discover the views of participants involved with the innovation. The participants were asked about their involvement, how the assessment compares with other assessments; and also to comment on the use and value of the innovation. The interviews involving clinical nurses also focused on the way that recently qualified nurses practise nursing. The data, it was hoped, would serve to verify if nurses provide care within the framework of the nursing process, which is referred to as a problem solving approach to care. The interviews were semi structured, but open-ended and discursive, tape recorded and transcribed.

Kidder (1981) states that unstructured or semi-structured interview is best used when

investigators are scouting a new area of research or when they want to find out what the basic issues are, how people see the topic, what language is used by respondents, and their level of understanding. She states that:

“Not only does it permit the subject’s definition of the interview situation to receive full and detailed expression, but it should also list personal and social context of beliefs and feelings. This type of interview achieves its purpose to the extent that the subject’s responses are spontaneous rather than forced...”

(Kidder 1981, p.187)

Questionnaires

Data was gathered from 98 student nurses by means of a survey-type questionnaire, with free and fixed response formats to obtain both quantitative data and open-ended comment. The students were all within the last two months of completing their pre-registration course, and had been assessed by means of a PSCH test on three separate occasions, each coinciding with the end of the first, second and third year of study, respectively. The data generated by the questionnaire served to inform the researcher about the views held by the students regarding the PSCH. The questionnaire considered whether the assessment task correlated with tasks of the real world. It also considered what students perceived as issues of concern.

Marker Studies

In the case of this study, traditional reliability measures are not appropriate, thus, no split-half study was carried out. This study considers the consistency of standards in marking. The reliability of marking was assessed by the 'mark-remark' procedure with different

markers scoring the same piece of work (inter-rater reliability) and the same marker scoring the same pieces of work on different occasions (intra-rater reliability). This was calculated using correlation measures.

Ethical issues and the role of the researcher.

It is now widely accepted that all kinds of research involving or impacting upon humans should conform to the highest standards of academic integrity and ethical practice. Among the essential values for research is that of the integrity of researchers. This includes the commitment to research questions that are designed to contribute to knowledge, a commitment to the pursuit and protection of truth, a commitment to reliance on research methods appropriate to the discipline, (Frankfort-Nachmias and Nachmias, 1992).

This study is a non-therapeutic research with human involvement and was conducted with the intent to derive knowledge and not to be of direct benefit to participants (although it may do so). Approval to conduct this study was granted by the Research Ethics Committee following the submission of a research proposal.

There is a wide consensus that research involving human participants should be performed with the informed consent of the participants, (Faden, 1986). This is an idea which is rooted in the high value we attach to freedom and to self determination. Relating to informed consent it was not deemed necessary that each participant gives a signed consent as they were not being placed 'at risk'. However, every attempt was made to gain

verbal consent and participants were informed that their involvement was voluntary at all times and that they were free to withdraw at any stage of the study. The subjects who agreed to participate were given, either verbally, and or in writing, a thorough explanation of the benefits, and rights involved as a consequence of their participation in the research project.

Throughout the period involving data collection, the perception of my role as Senior Tutor, in a position of power and authority, was likely to cause some infringement regarding voluntary consent. The role of senior tutor as researcher will not be found by some to be wholly satisfactory. All practitioner-client relationships (be they senior lecturer - lecturer relationships, or lecturer - student relationships) are power relationships. In a Foucauldian analysis (see e.g., Foucault, 1980), power cannot be wished or legislated away, it is inherent in all relationships. The perceived position of power and authority was likely to pose both constraints and opportunities to people, processes and information.

Smyth and Holian (1999) state that “the insider-researcher has a past, current and future role in the organisation, which bring aspects of the organisational history, working relationships and personal alliances into play in the research process. These considerations and influences shape the perception and behaviour of the researcher and organisational members involved in the research”. A direct consequence is how this impacts on the nature and extent of the content of data and how this is interpreted. This raises issues of validity such as bias and subjectivity; and ethical issues, including anonymity and coercion. As an insider-researcher one faces issues of credibility both

within one's organisation and when reporting the research findings to an external audience. All those issues were addressed during different phases of the research. Of particular value for this study was that it was submitted for a research degree, and was therefore supervised by an educationalist from outside the institution. This helped to ensure that the researcher's strategy would be challenged if personal bias tended to predominate. However, Burgess (1989, p. 68) would argue that the researcher might be tempted 'not to tell' if the standards of the institution seem inadequate. Being economical with the truth might be more of a dilemma for the insider-researcher than the outsider-researcher. Research has shown that "individuals and institutions stand to gain or lose by the transmission and utilisation of knowledge acquired in an evaluation" (Simons, 1989, p. 117). Whilst external researchers might be less concerned about the effects of their studies, the insider-researcher must always be aware that their study could affect the "delicate credibility structures amongst one's own colleagues" (Griffiths, 1985, p. 210). The effects on my colleagues and students was only one of my concerns. To diminish the problem of not portraying data in context, and possible resulting in unfair criticism, the findings were discussed with the participants.

One approach is to adopt a 'subjectivist' approach to evaluation (Simons, 1980) where the insider-researcher expects to establish and foster a relationship with the evaluated. This was seen as essential to this study. The values of openness, shared critical responsibility and rational autonomy (Elliott, 1991, p. 67) were perceived to be essential if the aim was to get to the truth. However, Simons (1989) suggests that while researchers might believe they can be open and be seen as partners in the evaluation process, students might find it difficult to see them in this way. Students might feel that they could be

discriminated against if they refuse to participate in the research. It was therefore necessary that all participants be given free choice about whether to participate in the study.

To help minimize possibilities of coercion, the researcher attempted to create an egalitarian relationship with the participants. Every effort was made to view the research endeavor as a joint venture in an exploration of the unknown. The Student Representative Council (SRC), made up of representatives from each cohort of students, helped to pave the way through their own council meetings and the discussion groups they held with cohorts of students. Lecturers who had been involved either in the design and development, and or the marking of students' PSCH work added their support to viewing the study as a 'collaborative venture'. Throughout data collection, the researcher felt reasonably confident that the rights and welfare of research participants had been given appropriate consideration particularly with regard to consent, anonymity and confidentiality. Anonymity and confidentiality were enhanced by using codes to link participants to the information.

As an insider-researcher, the researcher felt that one had to work hard to get to know what participants in this study were really thinking about the innovation in question. Every opportunity was taken to encourage participants to be honest, particularly during periods involving data collection and discussion of findings. Verification was also undertaken through triangulation. Triangulation is regarded as a metaphor rather than a precise concept (Kelle, 19). Typically, the process of triangulation involves corroborating evidence from different sources to shed light on a phenomenon. At the crux of it is the

credibility of qualitative research in terms of trustworthiness, (reliability and validity in the traditional sense), (see Lincoln and Guba, 1985). Referring to the credibility of qualitative research, Eisner (1991) has suggested the use of standards such as structural corroboration, consensual validation, and referential adequacy. In structural corroboration the researcher has used multiple types of data, (data generated by thought verbalisation, semi-structured interviews, questionnaire and Inter and Intra-marker studies), to support or contradict the interpretation. As Eisner states, “we seek a confluence of evidence that breeds credibility, that allows us to feel confident about our observations, interpretations and conclusions” (p. 110).

Triangulation was done by the following approaches:

1. Methodological approach to data collection: This study used ‘thought verbalisation’, semi-structured interviews and questionnaires to seek data about the construct ‘problem-solving’ which is the central focus of this study.
2. Approaches to data-analysis: Relating to ‘Thought Verbalisation’ data were analysed using two approaches. One approach subjected the verbal protocols against Rowntree’s Schema of Cognitive Ability and the other subjected the protocols against the framework of ‘problem-solving process’. Both approaches were used to ascertain if aspects of problem-solving were present in the verbal data.
3. Corroboration of inferences made from data analysis: To support or contradict interpretations made from the data, respondents were invited to attend meetings planned by the researcher to discuss the findings of the study. A series of meetings was organised to meet participants in groups of ten. Meetings were

designated according to the methodological approach used for data collection.

4. Other sources: This involved checking the findings of this study against findings from other research studies that used simulation techniques and verbal protocols in the study of problem-solving.

CHAPTER 7**VERBAL REPORTS AS DATA: THE 'THINK ALOUD'
METHOD AS A MEANS TO VALIDATE THE PSCH****INTRODUCTION**

Performance assessments, as already explained in the previous chapter, aim to model the real learning activities that we wish students to engage with and, therefore, enhance validity. There is a growing consensus among educators that greater emphasis is placed on problem-solving, comprehension, critical thinking, reasoning and metacognitive processes; performance assessments permit students substantial latitude in interpreting, responding to tasks; and they result in complex responses reflecting integration of multiple skills and knowledge, (Haertel, 1992; Moss, 1992).

All the features which render performance assessment valuable for assessment to support learning, become problematic as they present a number of reliability problems not easily handled with traditional approaches to and criteria for reliability evaluation. Meeting criteria related to such issues as reliability, generalizability and comparability of assessments, at least as they are typically defined and operationalized, becomes problematic. This, according to Moss (1992) results in a tension between traditionally accepted criteria for validity and criteria that derive from concerns about instructional consequences of assessment, such as 'authenticity', 'directedness' (Frederiksen and Collins, 1989), or 'cognitive complexity' (Linn, Baker and Dunbar, 1991) which are commonly invoked when arguments for the value of performance assessments are made.

Recent developments in the philosophy of validity, which highlight the importance of

investigating the consequences of assessment use, provide theoretical support for the move toward performance assessment. The problem for validity researchers is finding the appropriate set of criteria and standards to simultaneously support the validity of an assessment-based interpretation and the validity of its impact on the educational system.

All writers concerned with the validation of alternative assessments, and this includes performance assessment, have agreed that validation for performance tests must attend to both the evidential and consequential bases of test interpretation and use, embracing not only the meaning of the scores themselves but also the relevance and utility, the value implications, and ultimately the social consequences of each specific testing application. They also agree that the criteria for judging all kinds of assessment should include attention to the processes that students are required to exercise, (Linn et al., 1992; Haertel, 1992; Moss, 1992; Gipps, 1994). Evidence is, therefore, needed regarding the cognitive complexity of the processes students employ in solving assessment problems.

Haertel's suggestion to use think aloud protocols would, one hopes, provide access to the cognitive complexity of the processes students employ in solving problems. This, he claims, will also provide the opportunity to examine solution approaches to task requirements. It is in this vein that thought verbalisation was used to assess the construct validity of the PSCH test.

There has been considerable research into decision making or problem solving within nursing in recent years using different methods to examine both the processes used in, and the outcomes of, making a decision. One of the most common methods employed to examine

processes of decision making involve the use of simulations together with a technique known as “think aloud”, (Lamond et al, 1996).

Typically simulations are used to present subjects with a problem task from a real life situation, with the subjects being required to make inquiries (collect information), reach decisions or conclusions (decide what actions they are going to take, based on the information presented) and sometimes carry out actions (acting on the decisions made) (McGuire et al., 1976). The main assumption with this approach is that simulations adequately represent reality, and therefore, the output of think aloud methods are valid illustrations of a subject’s thought processes.

Historically, there has been an emphasis on the investigation of generic problem solving techniques, based on the assumption that problem solving strategies could be defined and then taught to students (Parrino and Mitchell, 1989). In this context, therefore, the nature of the problem given to the subject did not matter, as the strategy (if it was a general problem solving process) would be the same independent of the simulation or problem scenario. However, researchers who have tried to identify these generic problem solving strategies have discovered that no such general ability appears to exist. Within the field of physics, Larkin et al. (1980) have found that experts appear to solve problems using different strategies to those of novices. Similar discoveries have been made in the field of medicine (Elstein et al., 1978) and nursing (Corcoran, 1986). It has been suggested that this difference between experts and novices appears to be linked to the content of an expert’s thought, rather than the processes which are used to think (Grant and Marsden, 1987). The content of thought is hypothesised to be different in experts and novices, with experts having a more

organised and effectively structured knowledge base, built up from their experience (Grant and Marsden, 1987, 1988; Larkin et al., 1980). The major finding of this work is that a subject's ability to problem solve is task or context dependent (Grant and Marsden, 1987; Kassirer et al., 1982; Larkin et al., 1980; Payne, 1982), with problem solving strategies closely linked to the subject's knowledge and experience (Kassirer et al., 1982). It is apparent that an expert's problem solving ability diminishes to mimic that of a novice when confronted with a problem outside their specialist area (Elstein et al., 1978; Kassirer et al., 1982).

The above points have important implications for the consideration of validity when using simulations as a way of investigating problem solving. This concerns the extent to which the think aloud protocols reflect the thought processes subjects usually use in real life. Another important consideration is the accuracy of verbal reports.

VERBAL REPORTING: ARE MENTAL PROCESSES ACCESSIBLE THROUGH INTROSPECTION?

Verbal reporting was borne out of psychological research that sought to understand in detail the mechanisms and internal structure of cognitive processes, loosely described as 'introspection'. Introspective access refers to the gaining of knowledge by the self about mental activity through the perceptual aspect of consciousness - 'conscious awareness', White (1988). Nisbett and Wilson, (1984) propose that people lack introspective access to their mental processes, and that retrospective causal reports about those processes are in general inaccurate. This proposition is based on their observation that subjects are sometimes:

- a. unaware of the existence of a stimulus that importantly influenced a response,
- b. unaware of the existence of the response, and
- c. unaware that the stimulus has affected the response.

Nisbett and Wilson, (1984) argue that if subjects are unaware of the above it follows that they cannot be aware of the intervening mental processes. They use this argument as justification for taking evidence for these types of unawareness as support for the access proposition. Referring to verbal reports, they argue that the accuracy of subjective verbal reports is generally so poor as to suggest that any introspective access that may exist is not sufficient to produce generally correct or reliable reports. They also point out that an accurate report is not sufficient to demonstrate 'access' to the mental processes. Introspective access, according to Nisbett and Wilson (1984) is restricted to personal historical facts, present focus of attention, current sensations, emotions, evaluations, plans, intermediate results in a series of observations, and knowledge of intentions which they refer to as 'content' or 'product' and not 'process'.

Some authors, according to White, (1988) have questioned whether the exclusion of these things from the concept of a process is correct. Smith and Miller, (1978) for example, have questioned the distinction between process and immediate result, which, they suggest, is artificial as there can be so many intermediate results in a process such as mental rotation. McClure, (1983) suggested that an intention is a process, he argues that it is not information or content.

According to White, (1988, p. 16), there are no less than three candidates for a definition of

'process': an operation in an information-processing system, a causal relation and a type of knowing how.

White, (1988, p. 16), states that when the term 'process' in an information processing model is "conventionally applied to an operation which transforms information; the product is then the transformed information". White suggests that adopting this convention might resolve some of the disagreement that follows Nisbett and Wilson's proposition. He goes on to say that an intention may or may not be content, and that it is not process unless it has the function of transforming information in some way. For White, a rule is not a process but its application might be and ability to report the rule itself would not imply awareness of the process of using it. White recognises that this convention regarding the use of the term 'process' is at present a theoretical construct of uncertain validity; and that, as long as process is defined as a theoretical construct, the Nisbett and Wilson's access proposition is true. However, he argues that statements about theoretical constructs are not so much meaningless as besides the point. The issue for White concerns the limitations on 'introspective access' to actual goings on in the head.

When process is defined as causal relations between mental events or entities, (Nisbett and Ross, 1980; Rakover, 1983), the Nisbett and Wilson proposition is true on the grounds that no causal relation can be observed. This point of view, according to White, is not universally accepted by philosophers; Schultz, (1982), for example, who argues for a *causal realist* position, where causes actually produce effects and can be known and observed. On this basis, claims White, a causal relation definition of 'process' is not sufficient to make the Nisbett and Wilson's proposal true by definition.

Talking about process as a type of '*knowing how*', White (1988) states that the process/content distinction is reminiscent of the philosophical distinction between 'knowing how', (ability to perform) and 'knowing that', (ability to report). He argues that causal reports are inappropriate as a test of knowing how since one could 'know how' without being able to translate that knowledge into the 'knowing that,' that a report could express. On that basis, he argues that *knowing how* to do, that is process, is then all the access that one could expect anyone to have. He warns that in the extreme case, a 'knowing how' definition may render inappropriate not only the use of verbal reports as a measure of knowledge, but any proposition about access to process.

One can summarize, from the above debate, that verbal reports of human subjects have been thought suspect as a source of evidence about cognitive processes. This view is based on the assumption that introspective access to mental processes would be sufficient for an accurate verbal report about those processes, and, by implication, that an inaccurate verbal report would be evidence for lack of introspective access. White states that the set of beliefs as described by Nisbett and Wilson, about introspective access, has not been substantiated. He rejects Nisbett and Wilson 'access' proposition as this depends upon a distinction between process and content that, in his view, has not so far proved susceptible to valid definition. He states that:

"Nisbett and Wilson's proposal cannot be maintained. The access proposition suffers from failure to define the key term 'process', from dependence upon untested assumptions about the nature of and limitations upon 'access', and from uncertainty about the *type* of information or 'access' that would be beneficial to the accuracy of a causal report".

(White P, 1988, pp-36)

White suggests that more progress could be made if a distinction between product and process is not required. He hypothesises that actual links between any sort of internal events and verbal report content do not depend upon any type of introspective access or awareness, conscious or not, but upon other sorts of factors, such as information-processing.

This 'information-processing approach' to verbal report production, claims White, although not without drawbacks, "has the advantage that operations involved in verbal report production, and the relations between them, are specified with some exactness" (p. 38-39).

INFORMATION PROCESSING

The approach used by Ericsson and Simon (1980) is based on the hypothesis that human cognition is information processing. They state that "a cognitive process can be seen as a sequence of internal states successively transformed by a series of information processes".

Within the framework of this information processing model, Ericsson and Simon make the assumption that information recently acquired would be stored in the short-term memory (STM) and is directly accessible for further processing (e.g., for producing verbal reports), whereas information from long-term memory (LTM) must first be retrieved (transferred to STM) before it can be reported. This picture appears to be consistent with other hypotheses relating to information processing. Some theorists propose that what we call STM is not a separate, specialized store but simply a portion of LTM that is currently and temporarily activated. The important hypothesis for Ericsson and Simon is that "due to the limited capacity of STM, only the most recently heeded information is accessible directly" and since

a portion of the contents of STM is presumed to be fixated in LTM, "this portion can, at later points in time, sometimes be retrieved from LTM". This is based on the assumption that any verbalization or verbal report of the cognitive process would have to be based on a subset of the information in these memories. From this and earlier mentioned hypotheses, Ericsson and Simon have devised a taxonomy of verbalization procedures which provides a theoretical foundation for some of the distinctions made in types of verbalization.

TAXONOMY OF VERBALIZATION PROCEDURES

In response to the criticism (Nisbett and Wilson, 1977) that verbal reports might produce inaccurate data, Ericsson and Simon (1980) distinguished between two types of verbal report: **concurrent** and **retrospective**:

"Producing verbalizations may be the subject's primary task, or only incidental to the 'real' task that he or she is addressing. The verbalization may either be concurrent with task performance or retrospective."

(Ericsson and Simon, 1980, pp 218.)

Concurrent verbalization is the process involved whereby information is verbalized at the time the subject is attending to it. Concurrent verbal report results from investigators' instructions to subjects to "*talk aloud*" or "*think aloud*" while performing cognitive tasks. It provides direct verbalization of cognitive processes and thus is believed to be consistent and complete. Ericsson and Simon state that with the instruction to verbalize "a direct trace is obtained of the heeded information, and hence, an indirect one of the internal stages of the cognitive process." This is an indication of their belief that introspective access is possible. Another type of concurrent verbalization relates to procedures when subjects are probed,

concurrently with their performance of a task, for specific information, usually of a kind that they presumably need to guide their succeeding behaviour. The examples given by Ericsson and Simon are requests to subjects to report the hypotheses they are using in concept learning and discrimination learning.

Retrospective verbalization involves the subject being asked about cognitive processes that occurred at an earlier point in time. The subject is asked to retrospect about their thought processes in experiments with many trials or to answer general questions, and thus must try to synthesize all the available information after selective recall. It requires retrieval of information from past learning experiences and thus might provide inconsistent or incomplete information about one's thinking during a specific problem solving task, although it could provide a more complete description about one's reasoning strategies. Another form of retrospective probing is a method, which Ericsson and Simon call *interpretive probing*, in which subjects are probed at the completion of an experimental session consisting of large number of different trials. This procedure is sometimes justified as eliminating any possibility that the probing will affect the 'real' data of the experiment. Ericsson and Simon's main criticism of interpreting probing is that it cannot be relied on to produce data stemming directly from the subjects' actual sequences of thought processes, instead it encourages or even requires subjects to speculate and theorize about their processes. Ericsson and Simon suggest that the variety of inference and memory processes that might be involved in producing the reports make them extremely difficult to interpret or to use as behavioural data. They also point out that in situations in which similar information is attended to over and over, the model of information processing would predict that "retrieval of specific items will be hampered by extensive interference", thus suggesting that information accessed may be

inaccurate. To minimize the possibility of inaccuracy in information retrieval they propose that cognitive processes of short duration can be studied where the verbal responses lag the task processes by only a brief interval.

Ericsson and Simon, (1980, 1984), maintain that the verbalization of one's thoughts will not interfere with ongoing cognitive processes, nor will it affect the speed of task performance, unless verbalizations are queued by investigator probing. Henry et. al's (1989) study involving 60 paediatric nurses support these two premises, they found no effect on performance, regardless of level of expertise, when subjects thought aloud while problem solving, compared to when they did not. Henry et al divided their subjects into three groups and gave subjects from each group different instructions regarding a cognitive task: instruction to think aloud, instruction to recall thinking, and no instruction to verbalize.

Ericsson and Simon, (1980), also found that subjects assume a more analytic problem solving style when they are instructed to verbalize, thus supporting Hofgen's (cited in Merz, 1969) research finding. Hofgen compared performance on parallel forms of the Figure Reasoning Test between a group that had previously verbalized on an initial form and a control group that had not. The verbalizing group performed significantly less well when not required to verbalize than before, but still somewhat better than the control group, whose performance hardly differed between the two occasions.

The conclusions that can be drawn from Ericsson and Simon's research are as follows:

- Concurrent verbalisation is more reliable than retrospective verbalization in providing verbal data about reasoning during a problem solving task.

- Thought verbalization does not interfere with ongoing cognitive processes.
- Thought verbalization does not affect the speed of task performance.

This brief review of the literature indicates that there are contentions in relation to using verbal reports to provide access to mental processes. However, it does seem to be a defensible technique. The use of thought verbalization in this study is as a contemporaneous "think aloud" to try and understand the processes students were going through when doing the Problem-Solving Case History test.

AIM OF THIS PART OF THE STUDY

The purpose of this part of the study is to search for evidence that students engage themselves in problem-solving activities whilst engaged in the PSCH, (written simulation test- see appendix 3), in order to validate it. The information that the subjects concentrate upon will be identified and inferences made about the reasoning processes that subjects use to care for the clients depicted in the case history.

METHOD

Concurrent verbalization was used as the technique to generate data. The participants were given instructions to think aloud whilst working through the written simulation. Each subject was scheduled for an individual session in a quiet setting that facilitated thinking aloud. The entire session was audio taped and subsequently transcribed to produce the verbal data. Subjects were instructed to think aloud as they problem solved to resolve the simulated tasks.

They were told to constantly think aloud, and if they paused for longer than a few seconds they were reminded to keep thinking aloud. Interaction between the subjects and investigator was kept to a minimum so as not to interfere with the subjects' flow of thought. At the completion of the 'think-aloud' phase of data collection a brief follow-up interview was conducted. This lasted for approximately ten minutes. With participants' permission notes were taken to clarify subjects' thinking and identify subjects' reasoning strategies. This added to the overall validation and helped to establish further trustworthiness.

Sample - This study involved 8 students. The participants were within the last six months of the final year of the three year pre- registration course leading to Part 12 (RN) of the Register. The participants were approached whilst they attended the college during a period of study. Of the cohort of 30, twelve students were approached, selected at random, (odd numbers chosen from the list of students) and eight consented to participate.. The educational attainment prior to entry ranged from the General Certificate of Education Ordinary Level (GCE O'Level) to first degree status. The gender distribution of the sample, 87.5% female (n=7) and 12.5% male (n=1), reflects the female bias of the nursing profession, evidenced in recruitment profiles irrespective of programme type (Davies, 1995). The age range was from 20 to 31 years, and a mean age of 24 years. To control for variation in subject knowledge, all participants were chosen from the same cohort and the 'think aloud' study was completed over a 2-month time period, (December 1991 to January 1992), during one unit (module) of learning. The eight participants, (see figure 7.1) were assigned the following codes, (TA1 to TA8).

Figure 7.1

PARTICIPANTS' CHARACTERISTICS				
CODE	GENDER	AGE	EDUCATIONAL ATTAINMENT ON ENTRY TO THE COURSE	ETHNICITY
TA1	F	22	GCE (7 subjects at O'level)	British White
TA2	F	20	GCE (5 subjects at O'level)	British White
TA3	F	25	B.Ed (unclassified)	British White
TA4	M	29	GCE (3 subjects at A'level)	British White
TA5	F	31	B.Sc (Hons) Upper 2nd	British White
TA6	F	23	GCE (3 subjects at A'level)	British White
TA7	F	24	GCE (6 subjects at O'level)	British White
TA8	F	21	GCE (6 subjects at O'level)	British White

The sample was very biased in terms of gender and also covered a wide range of pre-entry level of education. Both these factors have an impact on problem-solving and thought verbalisation as the literature shows (Elstein et al. 1978, 1986; Corcoran, 1986; Tanner et al. 1987)). Since this study is not about assessing problem-solving or thought verbalisation per se. but rather the capacity of the PSCH to illicit and or allow problem-solving activity, one way of ascertaining this being the 'thought verbalisation', the sample characteristics should not be problematic. The more pertinent issue about the sample is its size and therefore the possibility of generalisation. A sample of 8 to 10 was aimed for; twelve students were

approached, however only eight students responded positively. In illuminative case studies, sample sizes of eight to ten are quite standard.

This small sample is consistent with other methods that produce qualitative data, since "*thinking aloud*" seeks rich, in-depth data. In previous studies, for example, samples have included only three respondents (Fonteyn and Fisher, 1995), eight respondents (Aitken, 1997) and nine respondents (Greenwood and King, 1995). This strategy is consistent with the views of Kuipers and Kassirer (1984), Fonteyn et al. (1993) who stressed that a methodology of discovery appropriate to the undoubted complexity of human knowledge requires rich data about individuals rather than easily analysed data about a population.

Material - The *Think Aloud* study used a written simulation test as the basis for the problem-solving task.

The written simulation test used in this study is a Problem Solving Case History, as discussed in chapter 5, (*Please refer to a sample of the PSCH in appendix 3*), which sets in perspective the location, the time of day and the staff complement. It consists of a series of nursing and medical histories of five patients (including one emergency admission), followed by a series of ten questions, set at different levels of cognitive ability, about each patient and the overall management of the care of the group. The questions are set across a time span to include: .

- Assessment, planning and organisation of work.
- Teaching of a junior student.
- Promotion of health and prevention of ill health.

- Reorganisation following events, (some events viewed or described as emergencies).
- Evaluation of care.

The ten questions were set at different levels of cognitive ability based on Rowntree's (1977) schema of cognitive skills. Rowntree's schema identifies four distinct levels: Recall, Application, Selection and Formulation. A detailed description of Rowntree's schema is given in Chapter 5, but is summarised below:

- Recalling facts and principles (*cognitive level 1*), (e.g. What is X?).
- Applying a given or recalled fact or principle (*cognitive level 2*), (e.g. How does X help you solve this problem?)
- Selecting and applying facts and principles, (*from all that you know*) to solve problems (*cognitive level 3*), (e.g. What do you know that will help you solve this problem?)
- Formulating and solving own problems by selecting, generating and applying facts and principles (*cognitive level 4*), (e.g. What do I see as the problem here and how can I reach a satisfactory solution?).

Of the ten questions, four were set at cognitive level 4, three were set at cognitive level 3, and three were set at cognitive level 2.

DATA ANALYSIS

The data obtained using the 'think aloud' method may be incomplete, and of course since Ericsson and Simon (1984) remind us that thought in the non-oral form can proceed much

more rapidly than speech, it is impossible for an individual to directly verbalize each and every thought in a series of thoughts when this occurs rapidly. Because there is no way to analyse unreported information, no conclusions can be drawn and no inferences made regarding thinking that occurred but was unreported verbally. In general, as Ericsson and Simon (1984) have argued, the information that is heeded during the task is the information that is reported; and the information that is reported is the information that is heeded. What is reported thus is likely to be what is perceived as important and what is not reported as less important. Thus, the knowledge provided by the analysis of this data can only be vicarious, as the information provided is about something that is not directly observed. However, this approach was felt to be the most appropriate for this task.

The premiss upon which the PSCH is based is the testing of problem-solving. This is based on the assumption that the test has the capability to elicit problem-solving skills whilst engaging test takers. Thus, if the reported information provides evidence of problem-solving processes this would suggest that the PSCH does indeed have the ability to elicit problem-solving skills. The main focus of analysis, therefore, is a search for evidence of intellectual processes that point to problem solving processes. In addition, evidence is sought, from the reported data, of cognitive processes which point to the four levels of Rowntree's schema of cognitive ability: recall, application, selection and formulation. Data analysis, thus centred on the analysis of reported information relating to:

1. The different cognitive levels of Rowntree's schema. In order to validate the PSCH test, it was important to analyse the data to establish if questions, from the PSCH test, were eliciting responses at the specified level of cognitive ability

2. The problem solving process. The data was analysed to establish if indeed student nurses problem-solve and what processes are involved when they are faced with a problematic situation.

Although both approaches have used a framework to guide analysis, care has also been taken to ensure that other issues, example the art by which practitioners sometimes deal with situations of uncertainty, uniqueness and value conflict, is not missed (Schön's, 1983, concept of knowing in practice).

Process involved in data analysis:

The process used to analyse data generated by the 'think-aloud' sessions involved the following steps:

1. All the tape recorded data generated by the 'think-aloud' session and the follow-up interviews were played, listened to attentively and transcribed.
2. All transcribed materials were read whilst recorded data were played back to check the accuracy of the transcription done. Emotional expressions, when these occurred, were noted on the transcripts.
3. Close reading of all the transcripts and follow-up interview notes was undertaken so that an overall impression of how the participants dealt with the various situations could be gained. It was also important at this stage to establish if participants worked through the test linearly dealing with each scenario as depicted in the test or if there was any tendency towards inconsistency.

4. Responses to each of the ten scenarios were analysed. As the test is set out as a series of episodes, along a time span, in the management of a group of patients, it was important to establish how each episode, depicted by a clinical vignette, was dealt with.
5. Responses to each scenario were then grouped according to the levels of cognitive skills these demonstrated. As indicated before, the test questions are set at different levels of cognitive ability and are based on Rowntree's (1977) schema of cognitive skills, it was therefore important to group the responses according to the respective cognitive skills: recall, application, selection and formulation in order to check that the questions were eliciting responses at the expected level of cognitive ability.
6. Responses were classified according to Rowntree's schema of cognitive abilities. Data was analysed to establish if the questions were eliciting problem solving responses at the specified level of cognitive ability.
7. Responses were analysed for problem-solving processes. The processes involved in problem-solving are discussed in chapter 3 and these were used as a framework to guide analysis.

Cognitive Skills Analysis

As Rowntree's (1977) schema of cognitive skills was used to develop the PSCH test, the use and imposition, to a certain degree, of a theoretical framework to analyse the data was considered appropriate as each question of the PSCH test has been set to test the participant at a particular level of cognitive ability. Mindful of this fact and being aware of the risk that the only information that is heeded at analysis is that which fits the theoretical framework, caution was exercised throughout so that key elements of thought processes were not missed.

The data was analysed to determine the cognitive skills used against Rowntree's schema, (see figure 7.2). In order to develop a coding framework a panel of experts, comprising of nurse educators and nurse clinicians, used Rowntree's schema of cognitive skills to develop a set of acceptable and/or standard responses to each of the scenario related questions depicted in the PSCH test. These responses addressed the plausibility and accuracy of participants' responses as well as the cognitive level of the responses. The theoretical framework which guided this approach is depicted in Figure 7.2. Data was coded according to the classification depicted in the theoretical framework. The data was examined to identify and code the multiple components of cognitive strategies (recall, application, selection and formulation). The frequency of appropriate responses from participants was ascertained and displayed in tables against the criteria that were agreed by a panel of experts for each question figured in the PSCH test, (see appendices 8, 9 and 10).

Figure 7.2

Framework used to guide cognitive skills data-analysis
Rowntree's, (1977) schema of cognitive ability
Definition: Rowntree's schema is an alternative to Bloom's Taxonomy. Although described as "coarse-grained", it is useful in thinking about levels of cognitive ability in relation to any content area. Rowntree's schema identifies four distinct levels: recall, application, selection and formulation.
Recall: recalling facts and principles
Application: the ability to use rules and general principles in particular situations
Selection: selecting and applying facts and principles - ability to make choices from a number of possible options.
Formulation: formulating and solving problems by selecting, generating and applying facts and principles. Production or creation of solutions and or ideas. This level includes creativity, analysis, synthesis, judgement and evaluation

Problem-Solving Process Analysis

Data was analysed against a framework of the problem-solving process. For a more detailed description of the process, please refer to chapter 3. This brief summary of what is involved in problem-solving and the problem-solving process serves as a reminder.

- It involves scientific knowledge and depends on agreements about ends: these being fixed and clear.
- Knowledge and cognitive processes are used to make judgement about the situation to select a course of action.
- It may involve a non-technical process of framing associated with reflective practice. This involves: 1. reflection-in-action which is stimulated by surprise, tacit knowing in action and tacit recognition and judgements; and 2. reflection-on-action which involves cognitive post-mortem and conscious awareness of knowledge used. In the professional practitioners' work, non-technical process of framing enables the practitioners to name the things they will attend to and frame the context in which they will attend to them.
- Problem-solving involves a process which is made up of the following steps:
 1. Phase of encoding characterised by internal problem representation; assimilation of problem statement and problem identification. Sense is made of the situation and the problem is constructed from the problematic situation.
 2. Building suitable representation or conception of the problem. Domain specific and strategic knowledge is retrieved from memory to enable problem setting and facilitate work on the problem.

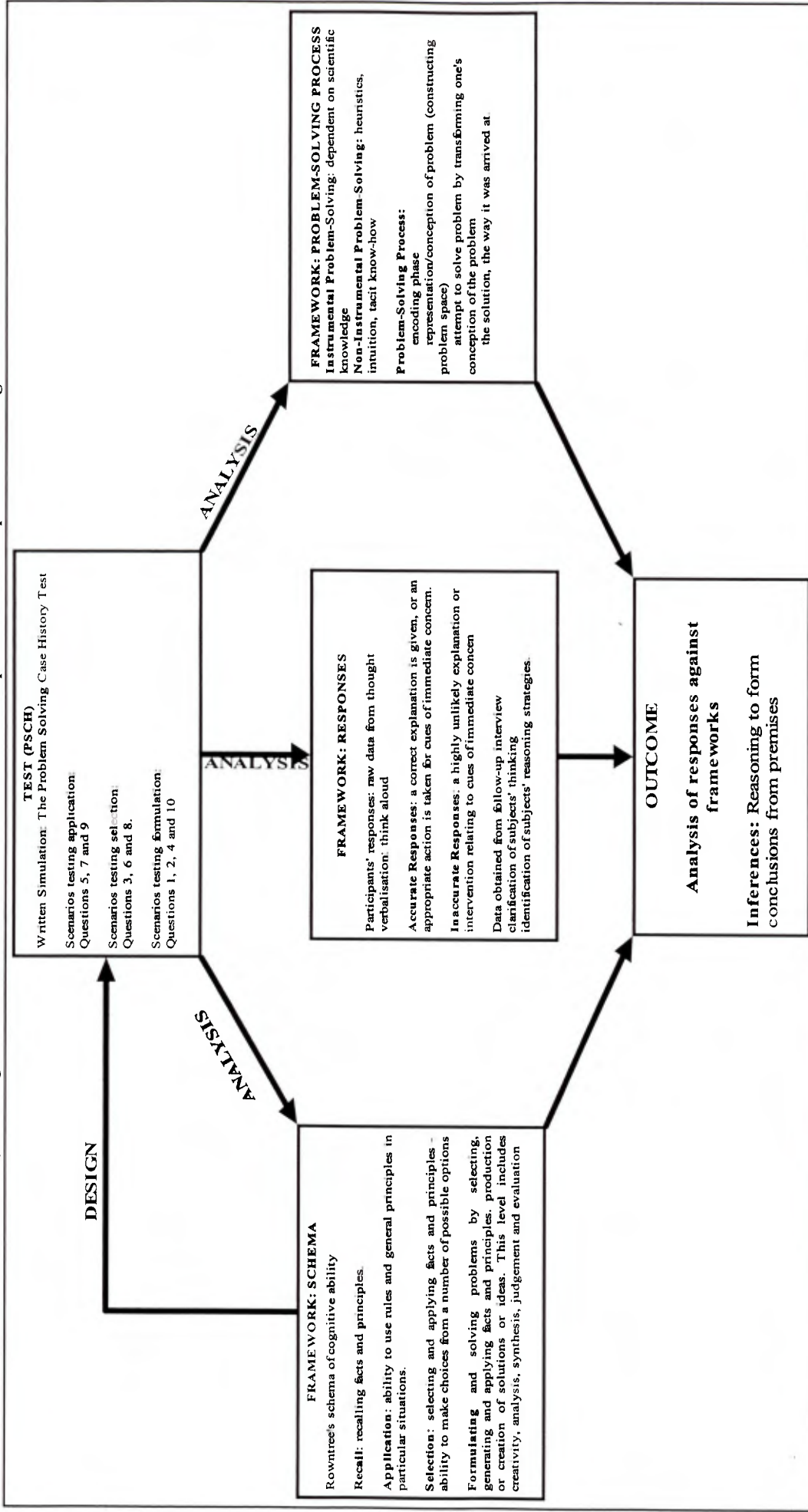
3. Solve the problem by transforming the conception of the problem. The problem is identified as familiar and previously learned solutions, based on principles or constructs of a domain, are applied. During this phase, problems may be solved by the use of heuristics which are orientating procedures which are not knowledge specific; not based on application of principles or constructs that underpin a domain; and are dependent on insights and understanding.
4. Solution: the way it was arrived at. This involves an evaluation of the problem-solving process.

The problem-solving process analysis involves checking the verbal responses to ascertain if respondents have used the features portrayed above, particularly focusing on the steps of the problem-solving process. Analysis concerned the responses of student nurses and involved the following areas:

- Does problem-solving in nursing involve scientific knowledge, or non-technical knowledge, or both?
- Does problem-solving involve problem identification and what perspectives determine their views of 'problems'?
- Are there other facets which do not fall within the framework referred to above?

The two approaches relating to the process of data analysis are illustrated in figure 7.3.

Figure 7.3: Framework for content analysis of cognitive levels of Rowntree's schema and conceptual elements of problem-solving and heuristics



REPORT AND DISCUSSION OF FINDINGS

Classification of levels of cognitive ability

The theoretical framework which guided this approach is depicted in Figure 7.2. Data was coded according to the classification depicted in the theoretical framework by the researcher. To ensure that interpretations were not, in any way, biased, 20%, (2 participants), of the data generated by the think aloud protocol was independently coded by an external researcher and the findings were compared. Frequent meetings were held with the external researcher throughout the period involving data analysis so that differences in perceptions and interpretations could be discussed. The research supervisor was also used to challenge the inferences made by the researcher. An example of a coded transcript is given in appendix 14.

Findings are dealt with under the following sub-headings: application, selection and formulation,

Application: The questions set to test application are 5, 7 and 9. As indicated previously problems are 'givens' and what is required is an articulation of how a particular action or group of actions would help solve the problem. Question 5 requires the participants to explain the advantages of administering salbutamol 2.5 mg diluted with 2ml of saline via a nebuliser, question 7 presents the participants with a situation where no warfarin is available for administration on the ward, and question 9 presents participants with a leaking overhead pipe directly above a patient's bed.

The reported information suggests that the PSCH test may be capable of testing the application of facts and principles as participants have articulated why a particular action is appropriate and how that action helps resolves the problematic situation. Participants have been confronted with three different situations. The first situation, (Q-5) requires the participant to apply his/her knowledge of the biological sciences and pharmacology to rationalize the choice of a method of drug administration to ensure a rapid response to therapy. For example, this is how two participants responded to this situation:

“Salbutamol is used as a bronchodilator. On reading this question I would have to ask myself why she has been given a nebuliser as opposed to an intramuscular injection. Salbutamol is used to dilate the bronchioles, the basic advantage is going to be the speed of the action, the blood supply is good in the lungs. Salbutamol is being inhaled, then the action is going to happen straight away basicall”, (TA2).

“Why not another route! Well, would take so much more time, this route is more rapid and this brings relief quickly”, (TA4).

This illustrates how physiological principles are used to articulate why this route of administration is more effective and safer in the case of Salbutamol. Looking at the situation it is obvious that the respiratory distress is perceived as the problem and that administration of Salbutamol is a means of relieving the problem. In this situation, both problem and solution are ‘givens’, the respondents have been required to articulate the rationale for this action.

The second situation (Q-7) requires the participant to apply knowledge of pharmacology together with management principles to ensure the continuation of a therapeutic regimen.

One participant responded by stating that:

“My first thought would be that Susan Ball has to have the warfarin in order that correct levels are built up in her blood. By not giving her the warfarin at the correct time, I would be exposing her to the risk of developing another pulmonary embolism”, (TA3)

Another responded by stating that:

"I would inform the senior staff nurse and would tell her of the predicament and inform her that I would be telephoning another ward to check if we could borrow some warfarin I would ensure that adequate supply of warfarin was ordered from pharmacy", (TA1).

All respondents have indicated that this prescription must be given and the reasons why this should not be omitted, suggesting that they are aware of the importance of this regimen, its safety and the likely effects resulting from omission. This clearly demonstrates how facts and principles are being applied.

The third situation, (Q-9) requires the participant to apply management and caring principles to ensure safety and comfort. This is how one participant responded

"The first thing to do here would be to help Mrs Ball removed from the immediate vicinity of the leaking pipe. I would help her get into a chair and with the help of Claire Bush move the bed to another location, but ensuring that the fire escape is still accessible. The wet area would be cleared and staff, patients and visitors informed, I would then get in touch with the works department. Mrs Ball would need fresh clothes and her bed would need to be changed", (TA8).

What is clear, from the reported data, is that participants appear to have thought through the likely effects of their actions. It would seem that they have ascertained whether the chosen actions are likely to be unsafe or placing the patient at risk. It would appear that the processes being used by participants are likely to be those of evaluation and judgement, which would suggest that problem solving processes are being used. One can reasonably conclude, with a degree of certainty, that questions 5, 7 and 9 of this particular PSCH test provide some evidence relating to one particular attribute, application, of Rowntree's (1977) framework.

Selection relates to the ability to make choices from a number of possible options. Questions 3, 6 and 8 were set to test the selection and application of facts and principles. The situations, (Q-3, Q-6, and Q-8), chosen to test cognitive level 3 of Rowntree's schema of cognitive skills have depicted three distinct scenarios involving a patient displaying feelings of frustration, a relative who is angry and distressed due to concern for a significant other and a friend who wants advice regarding the help that he could provide to assist with someone's recovery and maintenance of health. All three situations are highly relevant to what the nurse does in the context of practice and are issues that confront the nurse. The reported data have, to some measure; provided some insight into how the problems are contextualised, what aspects of the problematic situations are considered relevant and the actions that are perceived as the most appropriate in resolving the situations. Clearly, if those processes are in evidence, it suggests that those three situations have a degree of certainty in testing 'selection and application', cognitive level 3 of Rowntree's schema.

Relating to the situation depicted in question 3, It is clear, from the verbal reports, that the problem is perceived as resulting from a build up of frustration and that the behaviour is merely an expression rather than overt anger being directed to any one in particular. By stating that *"Mr White will be allowed time and privacy to express his feelings"*, (TA6) suggests that the problem is being constructed from the problematic situation, thus making sense of the situation. This process is described by Schön (1987) as 'problem identification', which, according to the literature, constitutes the first stage of problem solving process (Dewey, 1910; Miaer, 1930; Newell and Simon, 1972; Polya, 1957). There is also evidence of what Schön (1987) describes as 'problem setting' where participants have "named the things to which they will attend, (*Mr White's expression of frustration and the student's*

feelings - TA2, TA3, TA8) and framed the context in which they will attend to them". The context here is the nurse patient relationship; the interaction that exists between nurse and patient in this situation has been constrained and this may lead an inexperienced nurse Bush feeling rejected and perceiving Mr White as an 'unpopular patient'.

Although no mention is made regarding other options or approaches that may help resolve the problematic situation, the fact that an exploratory approach is used to find out why Mr White is upset suggests that one is considering an approach that would be most appropriate and acceptable to the individual/s involved. It would appear that the problem has been identified with some degree of clarity without the need to articulate all the conceivable approaches. What the participants have attempted to do is to build a suitable representation of a problem, a process which Newell and Simon's (1972) refer to as 'constructing a problem space'. Having done so, they have solved the problem by attempting to 'diffuse the situation' for both Mr White and the student and thereafter helping Mr White to recognise the importance of his rehabilitation and student nurse Bush to understand that she was not the cause of the anger. The strategy adopted here appears to go beyond Rowntree's explanation relating to 'selection'. Since problem 'identification' and 'setting' are evidenced, it would suggest that skills that are more advanced than selection are being tested. However, since one is informed that Mr White showed signs of frustration whilst attending the physiotherapy session, one can logically conclude that his anger may have been due to feelings of frustration. Thus, the problem in this situation is a 'given' and it only requires the participants to rationalize their actions, which they have done, judging by the data reported.

In the case of Mrs Briggs' daughter, the information reported suggests that further exploration is required, "*find out the cause of her distress and anger*", (TA2) and "*discuss the problem privately*", (TA3). What is highlighted in this situation is the process of 'problem identification' and 'problem setting'. Subsequent to this, the participants have reported that they would handle the situation with sensitivity by

"adopting a calm, non - judgemental approach", (TA8)

"giving Mrs Briggs' daughter time to explore her feelings", (TA2)

and *"finding out what the daughter feels should happen to her mother"*, (TA3).

What all this suggests is that Mrs Briggs' daughter's dignity is maintained, she is listened to and is persuaded to look at things from her mother's perspective. This, it would appear, demonstrates an understanding of the principles relating to the establishment and maintenance a good interpersonal relationships. Again, there appears to be some evidence of the use of selection and application.

Relating to question 8, the request made by Mr White's friend involves the participants making a decision as to what one should know to help Tim's recovery and thereafter to promote and maintain his health. Only 1 participant has made reference to Mr White's rehabilitation programme and how the friend can help, all participants appear to have concentrated on the promotion and maintenance of health. The information reported refers to participants' knowledge of the physiological and psychological factors, regarding Mr White's life style, that may have contributed to his current situation and the ways that one can alter one's life style to minimize the risk of recurrence. Comments such as:

"I would talk to him and point out that being overweight carries its own problem and contributes to causing stroke being overweight is associated with high blood pressure, a common cause of CVA", (TA4); and

"Being overweight means that one may have fatty deposits in the blood vessels (atheroma) which contributes to thickening of the arteries leading to high blood pressure, thus making the person vulnerable to CVA", (TA3).

suggest that participants are using their knowledge of aetiology and applying this to Mr White's life style to explain why CVA has occurred. What the reports also reveal is that the health promotion advice is based on participants' perception of the regimen that would help Mr White in particular. They have focused on his life style and addressed such things as the stress of being a business executive, the weight problem, lack of exercise and dietary precautions that would help reduce blood pressure. The strategy in use reflects an indication of what Rowntree (1977) describes as 'selection and application'.

Formulating and solving own problems by selecting generating and applying facts and principles, (e.g. What do I see as the problem here and how can I reach a satisfactory solution?). The questions set to test this cognitive ability are 1, 2, 4 and 10. In question 1, participants are presented with a story line including the type of ward, span of duty, deployment of ward staff and the number of patients involved in the care group. They are also provided with the patients' profiles and are asked how they would manage the care of this group of patient for the shift. This question generated a lot of information. A close reading of the transcripts suggests that participants have been systematic in how they dealt with the task at hand, that is: "How would you manage the nursing care?". Participants have approached the task using the following strategies:

1. Involving Claire Bush

Having been informed that they would be working with student nurse Claire Bush, all participants have given some consideration as to how they will involve Claire in the organisation, planning, and implementation of care. The following are some of the comments made.

"I'd introduce myself to Student Nurse Bush, find out how long she has been on the ward and then go through the care plans of each of the patients checking that she knew what is wrong with them and that she understands the diagnosis and the treatment they are receiving", (TA8).

"Claire Bush is on her second allocation, but it does not say how far in her allocation she is at. She may not know the patients at all or she may know them really well, so I would talk to her about that and assess her knowledge of them", (TA4)

On their own those statements merely indicate one's intention relating to Claire's involvement and no inference can be drawn relating to analysis, synthesis or evaluation. However, viewed in the wider context of the situation, the reported information provides access to one of the participants' key objectives in the planning of care, which is to establish rapport with Claire so that her education needs can be identified, her learning facilitated and her involvement in care structured through patient allocation and supervision.

2. Examination and analysis of information provided.

The reported data indicates that participants have examined and analysed the information provided in each of the four patient profiles provided at the beginning of the test. The analysis, it would appear, was centred on the standard set of circumstances presented about each patient within the given profiles, that is: their medical problem/s, the length of time they have been on the ward, their social background, their current regimen and how they are feeling at that given moment in time. The purpose of the analysis, it would appear, enabled

the participants to decide on the strategy of care for each patient for the specified span of time. The plan of care devised focused on patients' actual and potential problems, their perceived needs and the medical and nursing regimen already in place. The following comment provides some insight into how the analysis was conducted:-

"My aim for Mr White would be to get him walking to the toilet whenever he can, encouraging him to exercise" (TA6).

"He has got a right sided weakness, so he needs to be encouraged to use his right side" (TA2).

"Mobilizing will also help to relieve his pressure areas", (TA4).

What can be inferred from this report is that Mr White's rehabilitation is a means of dealing with the problem "right sided weakness", and that mobilizing would help prevent the potential problem which is the "development of pressure sores".

The following comments indicate the perceived health education need based on an analysis of Mr White's current situation:

"On the health education side, I would plan to talk with him about losing weight and about drinking alcohol and taking up some form of exercise to reduce his risk of having another cardio vascular accident", (TA3).

The following comments provide some insight into how the patients' perception of their progress helped to formulate the plan of care. This point is illustrated succinctly regarding the care of Mrs Briggs and Mr Bond:-

"I will see Mrs Briggs and ask her how her home visit went, explain that the O.T is coming to see me and find out if she has any questions that she wishes me to explore with the Occupational Therapist", (TA2).

"Then try and arrange for the relatives to come in to discuss the outcome of the visit as they feel she will not be able to manage alone in her first floor flat following discharge", (TA4).

"Looking at Mr Bond he looks like somebody who will not require any care, I think we will have to have a pre-operative chat with him to find out if he knows why this investigation is being done and how he feels about the likely diagnosis since he has smoked for over forty years ... give him time to talk about his likely diagnosis, find out if he is anxious", (TA5).

The verbal reports provide a richness of data involving participants analysing the information given in the patients profiles. What they have communicated suggests that they will seek and collect additional data from various sources about the patients involved, namely through current care plans, medical notes and the patients themselves. They do not, it would appear, consider the amount of detail given about each patient sufficient to proceed with a statement detailing the actions that would be taken for each patient within the care group. What can be inferred here is the perceived objective relating to the need for additional assessment of the client group. Further analysis of the data indicates that patient assessment is viewed as an important aspect of care and involves making observations, explorations, tests, inspections, enquiries, examinations and carrying out investigations. Analysis of the data, it would appear, enables the participants to build a suitable representation or conception of the problem, (De Groot's, 1978, second stage of problem solving process).

3. Shifting from specificity to generalizability

The participants have moved from the 'specific', where they have concentrated on nurse Bush and each individual patient, to the 'general', where they have considered the whole situation, that is, the care group being managed by a team. The reports indicate that participants have given consideration to: 'priority setting', 'patient allocation', 'provision for breaks', 'preparation in the event of an emergency admission' and 'delegation of responsibilities whilst having meal breaks'.

There is sufficient evidence from the reported data that participants have analysed their clients' data to help them with problem identification and representation. There is evidence that they have combined the various parts of their assessment in the formulation of an action plan to deal with the care group situation. The process of priority setting, it would appear, cannot be undertaken solely by recalling useful strategies from previously experienced situations since it requires a conceptual structure that includes knowledge that is specific to nursing, strategic knowledge and other useful information relevant to the task. The conclusion that can be drawn from the reported data is that Rowntree's (1977) criteria for formulation have been met.

Question 2 refers participants to Mr Bond's care plan and asks the participants how they would plan their care to observe for and minimize the problems he may experience following the bronchoscopy and biopsy. This question requires the participant to undertake two clearly identified tasks: the problems Mr Bond may experience following bronchoscopy and biopsy; and how the care should be planned to observe for and minimize the identified problems.

A close reading of the transcripts suggests the following:

1. Question 2 is perceived as knowledge dependent since participants think that they have to be knowledgeable about bronchoscopy and biopsy to articulate the problems that may arise following surgery.
2. The situation is not perceived as problematic as participants are requested to identify problems that are likely to arise subsequent to a procedure which is taking place in the future.

3. Participants' perception of the task is the structuring of a plan of action to monitor and prevent problems that are likely to arise following surgery.

The above observation is confirmed by the lack of evidence found of 'problem identification' or 'problem setting', (Schön - 1987), or 'problem representation', (Newell and Simon - 1972).

What can be inferred from the reported data is that participants are dealing with the task of observing for and minimizing the effects that bronchoscopy and biopsy may have on an individual. Those **effects**, thus, are the potential problems, and as such, therefore, require a certain amount of knowledge. The task takes on a complexity of its own as one is concerned with the prediction of problems that may arise in future. The complexity lies in the requirement of foresight, for it is foresight rather than hindsight, that is needed to resolve a foreseeable problematic situation.

All eight participants have reported that Mr Bond might experience the following problems:

- Aspiration pneumonia and respiratory obstruction may arise as a potential problem:

"if he has difficulty swallowing there is a possibility that he may inhale fluid thus giving rise to asphyxiation." (TA4)

- Haemoptysis is likely to arise as a potential problem for: -

"he may cough up blood ... they may have traumatised him when putting the tube down, so he might have internal bleeding" and "the risk that there would be haemorrhage due to the biopsy." (TA3)

- Pain and or sore throat is a potential problem in association with trauma caused from insertion of the bronchoscope.

- Anxiety, on the other hand, is perceived as an existing problem that will remain as such even after the operation -

"he was anxious before he went to theatre .. he is going to be more anxious now", (TA4). "Mr Bond might have found the bronchoscopy a very unpleasant experience and might be quite tense and upset afterwards ... he may be very worried about the results of the procedure", (TA3).

For each problem reported, an explanation is given as to its possible cause and the appropriate means to monitor its development. This suggests the use of thinking which goes beyond reproductive thought (recall). If recall alone were used, there would be no link established between the loss of swallowing reflex resulting from the effects of local anaesthetic, (*throat spray*) and asphyxiation resulting from inhalation of fluid; likewise no link would be established between biopsy or possible trauma during insertion of bronchoscope and haemoptysis. The link between cause and effect is fairly well established when the action to minimize the identified problem is reported - for example 7 participants reported that Mr Bond will be given nothing orally until cough and swallowing reflexes return, 6 participants reported that they would observe the sputum for blood and 7 participants reported that pulse and blood pressure will be monitored if there is any suspicion of internal bleeding. The actions taken speak volume in so far as insight regarding safety and prevention of complications are concerned. Mr Bond's airway is perceived as a priority post-operatively as

"the most important thing to check would be his respirations to ensure that the bronchoscope had not compromised his airway"; "bronchospasm following bronchoscopy may contribute to breathing difficulty", (TA3).

Judging by the seven responses given the monitoring of Mr Bond's blood pressure and pulse is considered to be equally important as respiratory distress and bleeding are perceived as life threatening, rather than a sore throat or anxiety.

Mr Bond's profile and the vignette make no reference to problems he may have subsequent to the surgery, it therefore requires the participant to either recall or formulate the problems. There is some evidence that reference has been made to anatomical structure and physiological mechanisms in identifying Mr Bond's problems suggesting the use of problem formulation rather than recall alone. The fact that no previous experience relating to bronchoscopy and biopsy has been reported by three participants suggests that they would have had to study and contextualise the given information prior to articulating what they perceived as the likely problems. The conclusion that one can draw, therefore, from the reported data is that Rowntree's criteria of formulation have been met.

Question 4 informs participants that at 14.30 hours sister in the accident and emergency department notifies them that Joy Kemp, a 25 year old police constable, is to be admitted with an acute asthmatic attack. They are also informed that Joy has no previous history of asthma and is on her own and extremely frightened. They are asked to describe, (giving reasons), how they would plan to meet her physical and psychological needs until the end of the shift.

A close reading of the reports indicates that Joy Kemp's respiratory distress is perceived as most in need of immediate intervention. Seven participants reported that oxygen therapy would be given and all eight reported that a bronchodilator would be administered and that they would sit the patient up in bed to improve oxygenation. All other physical and psychological needs are perceived as important but not life threatening.

The following comment reflects the urgency of dealing with Joy's respiratory distress:

"In planning Joy's care, I feel that her first need, at present, is the problem of shortness of breath. To alleviate this as much as possible, I would give oxygen and nebulisers as prescribed as the nebulisers will dilate her bronchi,... and therefore increase the surface area for the uptake of oxygen", (TA1).

"I would give oxygen, if this is prescribed because this would mean that her inspirations are of greater concentration of oxygen therefore she would get more oxygen around her body" (TA7).

"I would sit her upright to facilitate greater lung expansion I would monitor her vital signs regularly, at least half hourly until they are stable, monitoring especially the respirations and their shallowness", (TA3).

The next most pressing need relates to Joy's anxiety state which has been commented upon by 4 participants. The following is a report made by one participant:

"The second most important problem is Joy's fear, especially as she has not had an asthmatic attack before patients who have acute asthmatic attacks have been very anxious and it is a very distressing time for them I would alleviate her fear by talking to her calmly and gently all the time and reassuring her that her breathing will improve and that she is not going to stop breathing. I would tell her that I understand her fear", (TA8).

Since it is a well known fact that an acute asthmatic attack is characterised by respiratory distress and anxiety , one can argue that there is little need for 'problem identification' and 'problem formulation' relating to Joy Kemp's situation. There is no evidence, from the verbal reports, of an attempt at constructing the problems. The mention of "*narrowing and spasm of the airways*" alone does not indicate 'problem formulation', what is conveyed is knowledge of the physiological mechanisms involved in an asthmatic attack. If this observation is right, can one conclude that Rowntree's concept of 'formulation' is not being tested?

It would appear, from data analysis, that 'problem formulation' does not rest entirely on the analysis of data which appertains to the given situation or the client involved. It would appear that the analysis of relevant principles, (in this case the physiological and psychological

principles involved), and the explanation of how symptoms result from altered physiological or psychological mechanisms are also important features of problem formulation. The latter is probably more important since effective problem resolution often rests on successfully treating the altered physiological or psychological mechanism.

In Joy's situation, the breathing difficulty is caused by narrowing and spasm of the airways giving rise to wheezing on exhalation. During an asthmatic attack it is the expiration phase that causes more distress to the patient who struggles to push air out of the lungs, (quiet expiration under normal circumstances is effortless and occurs from normal recoil of the lung tissue - a passive process), as a result the alveoli progressively distend making expiration more of an active process and further tiring the patient. The alveoli distention contributes to hypoxemia and the patient becomes cyanotic. In this situation the patient is very distressed and anxious; the breathing difficulty is intensified as the patient becomes more anxious resulting in hyperventilation. There is also a danger of respiratory and or cardiac arrest. This is the nature of Joy's problem, so any statement made in the verbal report which relates to the problem itself or its resolution and addresses Joy's situation from this angle would indicate an attempt at conceptualising or formulating the problem. The comment

"I would give oxygen because this would mean that her inspirations are of a greater concentration of oxygen so that she would get more oxygen round her body", (TA5)

suggests that the participant in question has some notion of the rationale of this action. This is not conclusive evidence, but it provides some access to the thought process of the subject which may indicate that the problem must have been conceptualized in the first place, because the effectiveness of the action is dependent on correct formulation of the problem.

If one accepts this argument, then this question is valid and satisfies Rowntree's criteria of formulation.

In so far as other processes of problem solving are concerned, the articulation of what participants perceive as life threatening and their judgement about what constitutes a priority of care suggest that elements of synthesis, analysis and evaluation may have been used to create a plan of care. This observation is based on the assumption that the formulation of a plan of care is a result of the use of various thought processes involved in understanding and contextualising the problem, leading to a goal statement. The situation's portrayal of Joy's distress, however, does little to support this argument since it may have provided the participants with a clue of the perceived priority, which, invariably, would lead one to suspect that recall rather than problem solving would have been used. One suspects that the former is probably the case since the problem appears so evident. The amount of uncertainty associated with this particular situation casts doubt on whether or not Rowntree's construct of 'formulation' is being tested. Should one, then, reject situations of this kind as inappropriate for level 4 questions?

Since the participant is urged to reflect on altered physiological or psychological mechanisms when explaining the patient's complaint and the actions that would be taken to resolve the situation, there is a strong argument for retaining such question types. The problem might appear to be obvious, and as such is of little importance, (e.g. breathing difficulty), what is important is one's understanding of the cause and one's ability to explain the causal factors.

Question 10 presents participants with two distinct tasks: (1) how they would evaluate the effectiveness of the care they have given, (2) the main points about each patient that they would handover to ensure continuity of care. To some extent, the second task is a continuation of and is dependent on the task of evaluating the effectiveness of care, since one would be required to review the care that has been given in order that any upkeep or alteration of regimen could be effected. So, any aspects of care that one considers relevant and necessary to pass on during handover must have been thought through during the evaluation process. Thus, it is evaluation which is perceived as the most important aspect of this question.

This question represents the last of the four stages of the nursing process, which is concerned with the appraisal of the results of intervention. It involves assessing whether stated goals have been achieved or whether greater success could have been attained by different or additional approaches to the problems identified. Evaluation aims to determine if the objectives were relevant to the needs of the patients. It involves the process of examination of the whole experience of planning and implementing care for a group of patients. It involves the systematic collection, analysis and interpretation of data to determine whether and how well the objectives have been achieved and if there is a need to either maintain current regimen or use alternative approaches.

Close reading of the reports suggests that participants' perception of evaluation is as explained above. The following comments highlight this observation:

"In answering question 10, I would refer back to question 1 in which we are asked to plan care We need to ask ourselves whether we met the needs of those

patients", (TA2). "We also need to ascertain if we coped with any situations that arose correctly and effectively", (TA6).

The above is a statement of intent and as such it provides access to the 'process' of evaluation rather than the content. Statements of this type provide information about the individuals and the resources that would be involved in the process of determining the relevance of objectives to the needs of the patients and how well those objectives have been effective. One thing that one is made aware of, from the reports, is that all participants share a common understanding of the process involved in evaluating care.

Close reading of the reports suggests that evaluating care within a simulated situation is perceived as difficult, a view shared by all eight participants. The following comment highlights the participant's interpretation of what s/he perceives as what may be acceptable:

"I always have difficulty with the evaluation question, because I don't know how you can evaluate care that you have not physically given because you do not know what has gone on during the evening. So I think really what the question is wanting you to do is go through what you have planned for the care for the patients and then you have got to say whether you have met all the objectives that you set out to achieve all the things you intended doing", (TA4)

The issue of concern for this participant is whether one can realistically evaluate simulated care, since, as in the case of the PSCH, the caring involved is a cognitive exercise involving mental imagery - one is not physically involved. Similar comments were made by the other seven participants during the follow-up interview.

Evaluation of care within a simulated situation is possible as long as one does not view evaluation as all the processes involved in assessing and judging the quality of care or services rendered. Since the PSCH is an intellectual exercise, there is no reason for

evaluation to be anything but a theoretical exercise. It should be possible for one to state the criteria that would be referred to when determining the effectiveness of care. The following report given by one respondent provides an indication of the areas that may be involved in the evaluation process:

"Edna Briggs - we would evaluate the stability of her congestive cardiac failure and also her mental state. Presumably, by this time, some conference has been held involving Mrs Brigg's daughter and we would evaluate the effectiveness of this by looking at whether her daughter was any happier about the situation and what in fact had been decided and whether Mrs Briggs was happy about this too", (TA3).

Given the nature of the PSCH, the most that one could expect, in so far as evaluation of care is concerned, is a statement indicating the strategy that would be used and the criteria that would be examined. In some circumstances some form of data comparison may be used to establish whether a patient's condition has improved or deteriorated, however, this should be seen as the exception rather than the rule.

In so far as Rowntree's criteria of formulation are concerned, there is some evidence of the use of an action plan, which would satisfy the criterion relating to creativity. There is a clear indication of the use of a strategy or plan that would be used to make judgement about the appropriateness of the care given. However, this alone is not adequate to suggest that all the cognitive processes relating to formulation have been used since clear instances of analytical and synthesising behaviours appear lacking from the reports given. For example, statements such as

"we would assess whether her breathing had worsened or improved, whether the nebuliser was actually helping her breathing or otherwise", (TA8).

only tell us about what will be assessed, what is lacking here is an indication of the relevance of the information relating to success or failure of regimen or action taken. What would have helped here is the participant saying that an increase in the respiratory rate and or the presence of cyanosis would be indications that the regimen is not effective. Now, had there been instances of this kind in the reports, this would leave one with no doubt that analysis and synthesis have been used. As it stands one can only assume the use of those constructs. Thus no claim can be made that the reports given satisfy Rowntree's construct of formulation.

Relating to the second task of question 10, which involves reporting the main points that would be handed over to ensure continuity of care, the participants' reports do not include any reasons to indicate how continuity of care would be maintained if a particular point is included at handover. Reporting about Joy Kemp, one participant states that

"I would explain that she had been an emergency admission following an acute asthmatic attack. I would describe her condition since then, whether it had improved or worsened. I would mention the drugs and treatment she has had during that time. I would mention the success or failure of getting hold of a relative to come and see to her or just to be informed of her admission" (TA2).

In this statement the respondent is merely recalling the events that have occurred about Joy Kemp since her admission. In order to maintain continuity of care, the respondent would have had to include instructions such as the types and frequency of observations that have been taken during the day, and whether those observations need to be maintained during the night, for example the 'peak-flow' measurement, the pulse, respiration rate, temperature and blood pressure, and so on. It would appear that all the other participants have adopted a similar approach as the respondent quoted above.

All the data analysed relating to question 10, have failed to indicate the presence of the two most important thought processes involved in Rowntree's concept of formulation, namely analysis and synthesis. The following are some of the factors that may account for this observation:

The wording of the question "how would you evaluate care" may have focused the participants' attention to the process of evaluation rather than focusing their attention on what data to examine and how the data can objectively demonstrate the effectiveness or ineffectiveness of the care given, that is, the actions taken to resolve patients' problems or meeting their needs. One suspects that the wording of the question may not be inappropriate since the data reported for question 1, which is similarly worded, "how would you plan care", have revealed that participants have not only dealt with the 'process' but they have also spent a considerable amount of time dealing with 'content'.

The PSCH being a written simulation exercise may have caused the participants to perceive evaluation as problematic since all the care that would have been given throughout the test is based on mental imagery. Can evaluation be based on mental imagery alone?

The amount of data reported for this question is much less compared with that generated by other cognitive level 4 questions, suggesting that as participants were approaching the end of the test, they tended to rush through the report. On checking this observation at the end of their verbal reports, the participants indicated that by the time they had reached question 10, they were "mentally exhausted" and "had to motivate themselves" to complete the test.

Question 10 has the potential to generate the kind of data that would satisfy Rowntree's criteria of formulation, however, given the fact that all the reports analysed have failed to do so, a different approach to the testing of evaluation is called for or more time spent informing participants what is expected of them. To opt for the latter option is not likely to yield better results, since information given to participants was considered to be adequate. The following is proposed as an alternative approach to the testing of evaluation.

Instead of focusing evaluation of care as a 'group specific' task, a 'patient specific' approach is proposed. The 'group specific' approach has failed to generate the kind of data that would suggest that test takers are problem solving. It should be possible to evaluate the care of one or two patients out of the group situation provided that ones aim is to determine the effectiveness or otherwise of the care given to the patients concerned, rather than wanting a statement outlining a strategy for quality assurance.

Relating to the current PSCH, it is envisaged that the care given to Ms Joy Kemp could become the subject for evaluation. Instead of asking "How would you evaluate the care given to Joy Kemp", the test taker should be asked "What aspects of Joy Kemp's care would you consider essential to evaluate, and discuss how the findings relating to observations made about her state of health would indicate that her care has been effective." Or "With particular reference to observations made, how and what would determine that Joy's care has been effective?" This would require the test-taker to look at Joy's care from the time she was admitted to the ward until the end of the shift. One would then need to consider whether all her needs and actual and potential problems had been identified; whether the objectives of care were realistic; whether the actions taken to resolve her problems and needs were

appropriate. To check out if an implementation has been effective, one would need to refer to observations that have been made throughout the period that one would have been managing the care. For example, a series of observations carried out on Joy would help inform the observer if the actions taken are effective. In this instance one would need to refer to the blood pressure, pulse, respiration rate and depth, colour, peak-flow measurements, blood gases and certain information from Joy herself, (e.g. Is she still feeling anxious and frightened?). If one's motive relates to testing one's understanding of the principles of evaluation, then how one evaluates the care of one patient should suffice, since the same principles will be applied when evaluating the care of a group of patients.

With the exception of question 10, it would appear that there is sufficient evidence to suggest that this PSCH, at least, has successfully tested problem solving skills as depicted in Rowntree's schema. As proposed above, the principles of evaluation of care could be better tested using a patient situation rather than a care group situation as one believes that there is more chance of this approach fulfilling Rowntree's criteria of formulation. There is no doubt that further research is needed in this field, but at least for now if some evidence exists relating to the validity of the PSCH, then one should not hesitate to use it in nursing education.

The Problem-Solving Process

1. In nursing problem-solving involves both scientific and non-technical knowledge.

1.1 The relationship between knowledge and problem solving.

The bulk of the data contributed during the think aloud session relates to knowledge that is either specific to nursing or applied from other disciplines, for example life sciences and medical technology. Responses relating to questions 2, 4, 5 and 7 confirm that knowledge is essential in determining the most appropriate actions to take. The situation involving Miss Kemp and the prescription of salbutamol is an example that confirms nurses' dependence on knowledge.

"I would have to explain about asthma causing spasms in the bronchioles and the fact that the nebulised solution is going straight into the lungs and is therefore the quickest way of getting vasodilation" (TA4).

"A nebuliser presents the drug in vapour form, this would help to dilate the bronchioles and relieve the asthma" (TA2)

The above examples indicate that knowledge of anatomy and physiology of the respiratory system has enabled the respondent to rationalise correctly why targeting the problem at source (the bronchioles) leads to more efficient management of an acute asthmatic attack. The inference that one can make from these examples is that both respondents could also articulate why oral, or intramuscular administrations would not be as effective. Mr Bond's situation (question 2) is another example requiring knowledge of the a particular domain. The following example helps to confirm this:

"Mr Bond's immediate problem could involve problem with his airway as bronchoscopy could involve swelling of his airway particularly if there is any kind of blockage in his throat already, so I would have to watch him for any sign of respiratory distress, aslo as he had biopsy there may

be the possibility of haemorrhage in which case his vital signs would need to be closely observed" (TA7).

This example indicates that the decision of what to observe for (respiratory status and vital signs) is dependent on knowledge and its application. This is a clear example of the problem-solving process, based on instrumental problem-solving, in that the respondent has made sense of the situation (problem setting: biopsy may cause swelling), this is followed by the use of anticipatory schema ("blockage in the throat and haemorrhage") which is knowledge dependent, followed by strategic knowledge (watch for signs of respiratory distress and vital signs). There is also an indication that the respondent has displayed the 'problem setting aspect of a professional practitioner's work' in that he/she has named the thing to which he/she will attend, i.e. observation for blockage or haemorrhage. This is then followed by the relevant course of action: observe vital signs and observe for respiratory distress. How the respondent has arrived at the decision to observe is clearly not based on intuition (the immediate knowing of something without the conscious use of reasoning). The example given suggests that logic has been used and that logic was dependent upon knowledge of a particular domain. There is an element of reflective practice in the statement, however, this is based on reflection-on-action since the situation is not stimulated by surprise and there appears to be a conscious awareness of the knowledge in use.

The above examples indicate that, to be effective in solving problems in nursing, one needs knowledge and experience of the respective domain, (a point made by Meijer and Frériersma ;1986). This point was obvious with answers which did not fulfil the pass criteria, the facts or principles are either not known or incorrect or are wrongly applied. In some instances a 'blank' is left or the information given is incorrect or so limited that it clearly

indicates that one's knowledge of the given situation or task/s involved therein is so scant that one fails to articulate how the problem can be resolved. The following example related to question 7 (Susan Ball cannot have her warfarin tablets as the bottle is empty) illustrates how a lack of knowledge has led the respondent to fail to articulate why it was important to ensure the administration of warfarin.

“My first reaction would be to check stock cupboards Primarily here they are looking for your procedure of safe control of drugs in the trolley and it is important that the trolley is locked at all times”(TA2)

The respondent, in this situation has failed to appreciate the significance of omitting Susan Ball's warfarin. The focus of his/her attention relates to safety associated with drugs storage. Although there is plausibility in ensuring the safety of drug storage when this concerns leaving the 'drug administration situation', there is an obvious lack of understanding with regard to the omission of warfarin and its consequence on blood clotting.

Reading through the data, one is reminded that, to succeed at resolving a problematic situation, the nurse should have acquired a good working knowledge of the relevant domain, be able to comprehend the meaning of that knowledge, know when and how to apply the knowledge, be able to analyse the relationship of different pieces of information, be able to synthesize pieces of information and their relationships into a meaningful whole and cross check the entire information to evaluate whether they are defensible.

- The above discussion indicates that there is a relationship between knowledge and problem-solving in nursing.

1.2 Relationship of heuristics and problem-solving

Heuristics, as defined in chapter 3 are orientating procedures which indicate some possible strategies for reaching a solution by trying schemes which have been useful before rather than trying them all, (Turner 1997). Heuristics are not based on application of principles or constructs that underpin a domain. However, they are dependent on insight and understanding.

Responses to questions 3, 7 and 9 appear to indicate that problem-solving in the practice situation does not rest entirely on scientific knowledge. In question 3, for example, student nurse Bush appears upset on account of being shouted at by Mr White. The following response:

“Student nurse Bush, go away with her after talking to Mr White, ask her what happened, I’d be just assessing her whether she was very upset about it, or whether she was taking it all in her stride and she was not taking it all personally. She understood that Mr White was upset about something separate from her. She may have felt that it was more personal than that and be upset by it. Go somewhere quiet and talk to her about it, tell her about the telephone conversation with the physiotherapist and what has been said, also talk to her about how she felt we dealt with Mr White” (TA4)

A part of the above statement seems to indicate that an attempt is being made to gain some understanding of the situation (I’d be assessing her) suggesting that the problem is being set in context. However statements such as ‘go away with her’, ‘go somewhere quiet’, ‘talk to her about it’, on their own suggest that knowledge principles are not needed for the action selected. Is this action based on ‘common sense’, or ‘intuition’ or ‘heuristics’? Since ‘common sense’ is a set of general unexamined assumptions as distinguished from specially acquired concepts this action is not based solely on common sense since the respondent is

attempting to assess how the student feels and how she is reacting to the given situation. Intuition, on the other hand, suggests that immediate knowing has taken place without the conscious use of reasoning. The need to establish what had happened points to conscious reasoning as attempts are made to establish the cause and the consequence of Mr White's reaction, this rules out the use of intuition. In this situation the respondent has predicted the behaviour of nurse Bush based on information about how he/she, or other persons would react in similar situations. If this is the case, it would suggest that representativeness heuristics are at play. It is indeed difficult to know if heuristics are used by merely examining the statement made. At follow-up interview the respondent was asked to explain the basis of the action taken. The following is the explanation given:

"I have witnessed similar situations before where nurses have been very upset after being shouted at by patients. It is always best to diffuse the situation and remove the nurse from it. That's what others would do in similar situations" (TA4).

'What others would do in similar situations' confirms the probable use of 'representativeness heuristics'. However, there is no certainty in the inference made here. In question 7, for example, the focus is about the implication of having no warfarin medication for Mrs Ball, but the resolution of the problem is not based on scientific principles, rather it is based on common sense as indicated in this statement,

"I would telephone another ward to check if we could borrow some warfarin" (TA8).

The leaking overhead pipe in question 9 and the emotional frustration of Mr White in question 3 are situations that have been resolved by using non scientific principles. The

participants have used aspects of life skills in how they have helped to resolve the situations. Judging by the statements made, there is no certainty that the life skills used, in those situations, are underpinned by certain psychological constructs. The statements certainly do not allude to this. The reality is that how one deals with an emotionally charged situation is often based on how one has approached similar situations in the past; in this particular case there may, or may not be a clear set of rules that relates to how one deals with this situation. What is clear, from responses made, is that no scientific basis is given for how one approaches similar situations. The following is what a respondent had said during the follow-up interview:

“I don’t know why, it just seems to make sense to do it. Can you imagine how tedious it would be if we had to give reasons all the time? Sometimes we know it is right but don’t know why. This is a fact of life.” (TA5)

Schön’s, (1987) notion of professional artistry comes to mind with the kind of statements made above, however one cannot speculate without further exploration; ‘Tacit know how’ that one develops through experience may be in evidence, but this is difficult to establish.

- The above discussion indicates that heuristics may be used by student nurses when they are confronted with situations which are not dependent on an insight and understanding of a particular domain.

2. How student nurses view problems

The data reveal that, to a large extent, nurses view problems from four different perspectives:

2.1 The patient perspective

The nurse, it would appear, is concerned with what the patient perceives as the problem or the need, so, it is the patient's problem and its remedy or resolution that one is dealing with. In this instance the nurse accepts the task of helping to solve the patient's problem, the basic criterion here is how well can the nurse identify the patient's problems and organise them for solution. Viewed from the patient's perspective the problem can be physical, or psychological, or social or it may have all three elements present. The patient's perception of his/her health state relates to how s/he is affected by whatever is causing the problem. Thus, the problem that the nurse is dealing with relates to how the patient is responding to the cause of the problem. This point is clearly illustrated in some of the data generated by the test, and in particular, the first question "How would you manage the nursing care for this group of patients for the afternoon and evening?" For example, referring to Mrs Briggs, Mr Bond and Mr White, two participants have the following comments to make:

"I need to chat to Mrs Briggs about her home visit this morning because it is a good idea to get her opinions and her feelings about the prospect of going back home I would also explore how mentally alert she is"(TA4).

"The O.T will come to discuss the outcome of the home assessment. I would liaise with her to decide on the outcome, then with Mrs Briggs herself and then try and arrange for the relatives to come in to discuss the outcome of the visit as they feel she will not be able to manage alone in her first floor flat following discharge" (TA2).

Relating to Mr Bond the information contributed seems to focus on exploration of feelings regarding the possible outcome of histology following bronchoscopy and biopsy. This is illustrated by the following statement:

"we will have to have a pre-operative chat with him to find out if he knows why this investigation is being done and how he feels about the likely diagnosis since he has smoked for over forty years ... give him time to talk about his likely diagnosis, find out if he is anxious." (TA5)

Relating to Mr White the focus of the exploration relates to "*whether he needs assistance to walk, whether he will need help to walk to the toilets or if he will require the use of a urinal*" (TA2) in view of his right sided weakness.

What all the above statements highlight is the importance attached to the contribution that patients can make in planning their care. The nurse, in this instance, is using the patient to formulate the problem, so that a better understanding can be derived. Insight into how the patient is being affected by the situation or illness can, theoretically, lead to more appropriate selection of solutions to the problems or needs identified. This approach seems to reflect a philosophical stance to nursing which views the patient as the central focus of attention.

The diagnostic perspective

The nurse, it would appear, is also concerned with diagnosis. The exploration of the patient's perception of their problems is in some sense an evaluation of the patient's personal responses to his/her human experience. This evaluation of personal responses is what Crow (1980) calls "a nursing diagnosis", which she says is quite distinct from a medical diagnosis. A nursing diagnosis is the identification of that aspect of a patient's condition of concern in their nursing care, (Bircher 1975). The statements quoted above suggest that the subjects are making sense of the situations or constructing the problem from the problematic situations, for example the uncertainty regarding Mrs Briggs ability to cope on her own. Those statements reflect a nursing diagnosis, since the outcome of this interaction with the patients will have some influence on the subsequent nursing activities. The interaction with Mrs

Briggs, for example, aims to establish the concerns that she may have about her forthcoming discharge;

“I think the most important thing here would be to talk to Mrs Briggs herself and find out how confident she feels about going home and what problem she feels she has. It says here she is very keen to try and go home and she is capable of going home. I feel I should support her and this decision, however Mrs Brigg’s daughter is angry and distressed, this may be because she is very worried about her mother and feels that she will not be able to cope at home” (TA1)

implicit in the statement is a concern for her welfare - does she feel able to manage alone; she lives in a first floor flat and the concern here is would she be able to manage the stairs. If the outcome is that she can manage the stairs, this would suggest that she would have some degree of independence and could probably manage to do some shopping. However, if the outcome of the visit suggests that she would have difficulty managing the stairs, this would no doubt influence how one plans for her discharge - for example, should she have intensive physiotherapy to strengthen her lower limbs or does one involve the social worker who could organise home help facilities or arrange for supervised accommodation (warden controlled accommodation). The processes involved are akin to Johnson’s (1972) first phase of problem solving which he calls, **preparation**, which he says “is concerned with processes related to preparation to problem solve”, that is laying the ground work for generating solutions. Schön (1987) describes this process as ‘problem identification’.

The doctor’s perspective

The next perspective that problems are viewed from, is the doctor’s perspective, either as part of medical treatment or medical diagnosis. The data generated by question 4 which relates to Joy Kemp who was admitted as an emergency at 14.30hrs with an acute asthmatic attack

point to this involvement. When asked how they would plan to meet Ms Kemp's physical and psychological needs, this is what the respondents contributed:

"I feel that her first need at present is the problem of shortness of breath" (TA1).

"To alleviate this ... I would give oxygen and nebulizers as prescribed. I would monitor her vital signs regularly, at least half hourly initially, Monitoring especially the respirations"(TA6).

"I would administer any drugs the doctor prescribed, they've probably prescribed a broncho-dilator" (TA8).

All participants have made comments about their involvement in medical regimen and the monitoring of the effectiveness of this medical intervention. The monitoring of vital signs is purposeful in that it is helping the nurse decide if the measures being taken are relieving the patient of her distressful symptoms, but equally it is contributing valuable data that would help the doctor determine whether the amount of drugs prescribed is adequate or not. The fact that the nurse is monitoring the pulse rate, blood pressure and respiratory rate and function means that she is contributing raw data that would help the doctor determine the effects the drugs are having on the cardiovascular and respiratory systems.

Nurses' involvement in medical diagnosis and regimen is also illustrated in the participants' responses to question 2 which involves Mr Bond. They were asked how their care would be planned to observe for and minimize the problems that Mr Bond may experience following the bronchoscopy and biopsy, and this is how one participant responded:

"Following anaesthetic Mr Bond's swallowing is going to be affected", (TA3)

Three participants have followed this through suggesting that there is asphyxiation as well

"if he has difficulty swallowing there is a possibility that he may inhale fluid thus giving rise to asphyxiation", (TA3). "The most important thing to check would be his respirations to ensure that the bronchoscope had not compromised his airway at all by causing trauma and bleeding, so the depth, rate and sound of Mr Bond's respirations should be observed", (TA3)

"He may cough up blood ... they may have traumatized him when putting the tube down so he might have internal bleeding", (TA5).

"The risk that there would be haemorrhage due to the biopsy, so that's what I would be looking for", (TA4)

"He may cough up blood, so you would have to observe for that a sputum pot should be made available", (TA5).

"If bleeding is internal, we would have to think about his blood pressure and pulse" (TA2).

"Although any bleeding caused by the biopsy would be first picked up by difficulty to breathe, this could also be assessed by taking his blood pressure and pulse. He would get tachycardiac and hypotensive if he was haemorrhaging. Also the effect of the muscle relaxant may cause his blood pressure to drop, so this should be checked" (TA4).

What can be inferred from these statements is the contribution that nurses make to medical diagnosis. Bleeding and collapsed lungs are clearly medical problems. What the nurse appears to be doing is looking for any sign or symptom that may raise one's awareness that those problems are developing. Clearly, the role of the nurse here relates to the collection of cues (building blocks of raw data) from which medical judgements are made about the patient's state of health..

The management perspective

Close reading reveals that problems are perceived from a management perspective, that is, how the nurse organises patient care. The nurse has to implement care for every individual

patient in her care group, and this includes nursing and medical regimen and what the patient considers as essential. The task the nurse appears to be confronted with is the coordinating of nursing, medical and other activities. The responses given to question 1 "how would you manage the nursing care for this group of patient?" illustrate this point. Management and organisation of care are dealt with as: assessment of work load, planning, and priority setting.

3. Other Issues

3.1 Assessment of workload: Three participants have made explicit comments regarding workload assessment. The focus of the reported information relates to discussion and team work involving the staff nurse and the student

"sitting down discussing the care plans, talking about the 'what we are going to do in the afternoon' and what work there is", (TA3)

"I think I'd go through all the patients with my nurse perhaps looking at their care", TA4).

"well, first of all perhaps introducing ourselves to all the patients and then deciding about priorities of care", (TA5).

This last statement suggests a certain amount of uncertainty as to how one should proceed. The participant is not quite sure if it would be better to discuss the care plans with Claire or to interact with her patients in order to have a more realistic view of what the priorities are. The 'thinking aloud', it would appear has enabled the participant to make a decision as to how one should proceed, the respondent has opted to

"look through all the patients properly, decide what care they need and then write them down in order of priority", (TA5).

What is not explicit in this statement is whether the 'direct face to face interaction' or 'reference to care plans' would be the chosen approach. *"looking through all the patients properly", (TA5)* suggests that face to face interaction would be the chosen approach. The

other two participants have been clearer about their method of approach, "*Claire and I would go round to see our patients, talking to them*", (TA4). "*and making a 'visible' assessment*", (TA5).

3.2 Planning activities: Three participants have commented about the need to be ready to receive an emergency admission since the ward is 'on take'.

"there is an empty bed and the ward is on take for emergency admission", (TA4).

"I think we could get everything ready in case somebody is rushed straight from casualty", (TA5).

"I'd first want to make sure that the bed was all made up ready for a patient in case we have an emergency admission", (TA3).

Other matters that have been taken into consideration are planning for meal breaks without putting continuity of care at risk and identifying time when student nurse Bush can be taught certain aspects of care. Most of the planning activities undertaken have been client specific rather than client group specific.

3.3 Priority setting: The information reported relates mainly to the process rather than content. The process involving face to face interaction with patients and Claire Bush, observation of clients, discussion regarding perceived needs and reference to care plans. The following statement highlights both the process and content of priority setting:

"I would go aside with Claire to discuss and decide what our priorities are and what sort of care the patients would need for the afternoon, and it is quite a difficult group of patients to prioritize with, but I think I would decide that Mrs Susan Ball is the priority", (TA3)

The conclusion that may be drawn from the reported information is that priority setting has been addressed as a 'client specific' strategy rather than a 'group specific' strategy. With the exception of two comments which reflect a 'group specific' approach, most of the other comments made relating to setting priorities seem to indicate that the client's individual situation has been the factor which has determined what would be perceived as priority of care. What the data appear to illuminate is that nurses tend to review each patient's situation prior to organising the activities of the group.

Management and organisation are clearly perceived as a nursing problem, requiring the nurse to assess the work-load situation and match this with the available resources. This requires the nurse to make decisions based on a careful consideration of what is considered important and necessary and what could wait until such time that resources become available. The nurse, it would appear, does not make this kind of decision in isolation, rather she works in a team including other professionals whose support she relies upon, since other professionals have their own priorities and are probably using the same resources as the nurse. In conclusion, the data so far examined seem to suggest that nursing students view problems from four different perspectives: the patient perspective, the diagnostic perspective, the doctor perspective and the management perspective.

The conclusions that one can draw from the analysis are as follows:

1. The Problem Solving Case History is capable of testing knowledge at different levels of cognitive ability.
2. Nursing students view problems from four different perspectives:
 - The patient perspective

- The diagnostic perspective
- The doctor perspective
- The management perspective

In addition, the evidence indicates support for the following:

- In nursing, there is a relationship between knowledge and problem solving.
- Heuristics may be used by student nurses when they are confronted with complex situations which are not dependent on an insight and understanding of a particular domain.

CHAPTER 8**THE USE OF THE SEMI-STRUCTURED INTERVIEW AND STRUCTURED QUESTIONNAIRE IN THE VALIDATION OF THE PSCH.****INTRODUCTION**

The previous chapter considered the use of ‘thought verbalisation’ to establish whether the written simulation test (PSCH) is any good as a measure of the characteristics, (problem-solving activities) we are supposed to assess. One of Messick’s (1989) crucial questions relating to the consequences of test use and interpretation has been addressed.

Messick’s second question: should the test be used for the proposed purpose, is an ethical one and its answer requires an evaluation of the potential consequences of the testing in terms of social values. This chapter considers the views of teachers, clinicians and students. As argued in chapter 6 the validation for performance tests must attend to both evidential and consequential bases of test interpretation and use, embracing not only the meaning of the scores themselves but also the relevance and utility, the value implications, and ultimately the social consequences of each specific testing application. Validation of this kind, suggests Haertel (1992) could be undertaken by longitudinal studies of curriculum and instruction before and after performance tests are introduced; interviews with teachers, students, curriculum co-ordinators and other relevant constituencies; and studies of trends over time in both performance test scores and other indicators of schooling outcomes.

AIM OF THIS ASPECT OF THE STUDY

The purpose of this part of the study is threefold and relates to the relevance and utility; the value implications; and the social consequences of the Problem Solving Case History Test. The aim was to investigate the consequences for individuals, (teachers, students and clinical nurses) and the institutions concerned, (the school of nursing and midwifery; hospitals and clinics), (Cronbach, 1988).

METHOD

Investigation into consequential validity of the PSCH was by means of a survey and involved two approaches.

1. The semi-structured interview was used to gather data from a group of teachers and clinical nurses about their perception of the PSCH test as an assessment tool.
2. A structured questionnaire was devised and used to gather relevant data from students involved in the study.

The main focus of this part of the study related to gathering evidence about the following:

- The cognitive complexity and meaningfulness of the PSCH test and the extent to which the assessment tasks simulate the 'real-life' situations.
- The impact the assessment has had on the school and employers.
- The impact the assessment has had on what and how teachers teach.
- The impact on student motivation.

SAMPLE

This part of the study involved 10 qualified and experienced teachers, and 10 clinical based nurses in a semi-structured interview; and 98 pre-registered students in a structured questionnaire. The student sample represented 13% of the overall student population, (n=720), for the location involved in the study. The selection of the respondents was largely determined by the nature of the study and the characteristics of the population. All participants were located at a single site, which, in this study, relates to the School of Nursing and Midwifery and the clinical areas used for the placement of students undertaking the pre-registration course in Adult Nursing. Sampling was not based on the usual criteria and techniques of statistical sampling. Subjects who had experienced the phenomenon, (PSCH Test), being explored and could reflect and articulate their conscious experiences served as the criterion for selection of participants, this is characterised as *primary selection*, (Morse, 1994).

Sample sizes, involving interviews in this type of study, are necessarily small because of the complexity of the data, which are expensive and time consuming to analyse, and because the data aim to provide rich insights in order to understand the social phenomenon rather than statistical information.

Approval of the study by the Research Ethics Committee sanctioned access to the site and the individuals selected for participation.

Characteristics of participants

The teachers had all been practising nurses prior to taking on the role of teachers of nurses and had held clinical posts fulfilling the roles of ward sisters or clinical nurse managers. They had all gained their teacher's qualification either through courses leading to the post-graduate certificate in education or the diploma in nursing education. All teachers had a clinical link role involving the provision of support to students whilst on placement. During the time that the study was undertaken, all the teachers concerned were involved in higher studies.

The teachers who participated in this study fulfilled the following criteria:

- Had been in post as a qualified tutor for longer than 2 years.
- Was an experienced marker - had been involved in the marking of the PSCH test consistently for a period amounting to a year.
- Had participated in the structuring of the PSCH papers either as members of the Curriculum Assessment Committee, or Board of Examiners or Item Writing Work Groups.
- Had participated in the evaluation of the assessment strategy for Pre-registration courses.

Six of the teachers involved were module or unit leaders for the Pre-registration course leading to the award of the Diploma in Nursing Studies and the RN qualification (Adult Nursing). The following codes were attributed to the teachers who participated, T1, T2 to T10.

The clinical nurses who participated in this study fulfilled the following criteria:

- Had been a ward sister or charge nurse for at least two years.
- Had undertaken the Teaching, Supervision and Assessment (ENB998) Course.
- Was an experienced assessor and has consistently conducted clinical assessments over a period of a year.
- Was ward sister or charge nurse of a ward designated for the training and education of student nurses.

Four of the ward sisters/charge nurses had also participated in item writing sessions relating to the PSCH and the other four had in the past been involved in curriculum planning. The following codes were attributed to the clinical nurses: CN1, CN2 to CN10.

The students involved in this study were undertaking undergraduate studies leading to the award of Diploma in Nursing Studies and the Registered Nurse (Adult Nursing) qualification. This award is the pre-requisite for registration with the Statutory Body -The United Kingdom Central Council for Nurses, Midwives and Health Visitors. The students were all approaching the completion of their pre-registration course, and the questionnaires were issued within the last three months following their last examination which included the PSCH.

Three cohorts of students were involved in the study, 32, 30 and 36 students each. One cohort of students also included the students who participated in 'think aloud protocol'. All participants had gained entry to the course on the strength of their achievement following completion of their secondary education, that is all students had 5 GCE O-level or GCSE subjects each at grade "C" and above. A good proportion of participants had studied

at GCE A-level and 2 of the participants had completed a bachelor's degree. Codes were not attributed to the students per se. Instead, the questionnaires were coded using the following categories (ST1, ST2 etc.).

PROCEDURE

Semi-structured interview

The teachers and clinical nurse were targeted by the researcher and informally approached. Those who agreed to participate received an information pack two weeks prior to the interview. The information pack comprised a letter detailing the main areas of the research, and terms of reference relating to validity and reliability; and a summary of the research proposals.

The interview was conducted in an office arranged for interviewing purposes. The telephone was disconnected and a 'do not disturb' sign placed on the door. An audio tape recorder was available to record the interview.

In a semi-structured interview the interviewer asks certain major questions the same way each time but is free to alter their sequence and probe for more information. This approach was chosen to focus on issues of particular importance to the research question. There was also a need to probe and clarify comments made by the informant and to use prior knowledge to help them in this process. The researcher aimed to give the respondent the freedom to address the issues which he or she deemed important and to talk about them in the way he or she chose. The researcher's role throughout the interview was one of gentle guidance rather than

firm control. Although there was a need to impose a framework the quest was for more knowledge about the experiences the informants had. Every effort was made to relax the respondents to support them not to react in any way which might suggest disapproval of their comments.

The structured questionnaire

A structured questionnaire, (see appendix 4) was devised and used to gather relevant data from students involved in the study. The researcher had scheduled himself in the students' timetables and allowed one and a half hours per cohort. Researcher involvement in this exercise had previously been agreed at a meeting of the Student Representative Council, (SRC). It was the SRC's wish to have researcher involvement in case of participants' need to seek clarification regarding the items included in the questionnaire. Prior to distributing the questionnaires, the purpose of the study was explained and subjects who did not wish to participate were given the opportunity to 'opt out'. Researcher involvement in this aspect of the study may have had a coercive element as there was a 100% response for all three cohorts involved in this study. However, they were unanimous and one advantage was that all questionnaires could be gathered at the end of the session.

The questionnaire consisted of four sections.

SECTION A:

This part of the questionnaire focused on the comparison of the PSCH with other methods of assessment. It is concerned with students' experience of a gamut of

assessment strategies and comprises 7 questions aimed at gathering data that would help the researcher compare the performance of the PSCH against other methods of assessment - Short Essays, Long Essays, Objective Multiple Choice Tests, Project Assignments, Nursing Care Study, Nursing Care Diary, and Nursing Case History.

Section A of the questionnaire involved a six point Likert scale which students used to rate the performance of each of the assessment they had experienced. The rating is 0, (least helpful or able) to 5, (most helpful or able). 0 was designated "strongly disagree", 1 "disagree", 2 "undecided" but leaning to disagreement, 3 "undecided" but leaning to agreement, 4 "agree" and 5 "strongly agree".

SECTION B

Section B is concerned solely with the use of the PSCH as an assessment tool. The data being sought related to the key purpose of the PSCH: simulation of the clinical situation, application of knowledge to clinical problems and the competences of nursing.

In this section a two point scale is used requiring the participants to select one of the categories, "yes" under certain circumstances or "no" that best expressed their feelings regarding the statements.

SECTION C

This section seeks information about the thought processes that students use when answering PSCH questions set at different levels of Rowntree's schema of cognitive

ability. The participants were presented with a grid which provided them with three alternatives, (Application, Selection and Formulation), along a horizontal axis arranged against a vertical axis comprising of the seven steps, (refer to chapter 3, or framework in chapter 7), of problem solving. Participants were requested to select the alternatives that they felt they were using when going through the seven steps of the problem solving process.

SECTION D

Section D was open ended and provided the students with the opportunity to contribute additional information about the PSCH.

DATA ANALYSIS

The qualitative data was processed and analysed in a systematic fashion so that trends and patterns of relationships could be detected. Descriptive statistics were used to describe and synthesize the data obtained from the student questionnaire. Frequency distribution was used to impose some order on the mass of numerical data. Qualitative analysis was done through content analysis which was used to analyse the data generated by the semi-structured interview of teachers and clinical nurses

Content analysis

Content analysis is a rigorous method of analysing text generated from interview transcripts. The aim is to identify key issues or patterns of responses and to illustrate the issues discussed

by respondents during their interviews.

The approach used was systematic and based on Riley's, (1990), framework, which is a useful reflection of the standard process most researchers embark on when analysing content. Riley advocates that analysis be broken down into tasks, as follows:

- **Organising data.** This relates to basic 'housekeeping' duties. Having tape recorded the interviews, all cassettes were labelled with information to aid filing. Transcribed data were photocopied and these were used to highlight important comments and for cutting out sentences or paragraphs which have a common meaning. This helped with sorting out the various categories.
- **Hearing what the data have to say.** To become familiar with the data the tapes were listened to, the transcripts read and the data sorted repetitively until it was possible to make summaries which describe them adequately. This helped with sorting out the various categories.
- **Recognising your own ideas about the data.** Attention was focused on points of significance and the researcher started to formulate ideas around the hypotheses which were being generated. During this stage ideas were with other individuals who had participated in the study, this helped to verify the inferences made from the data.
- **Organising evidence for interpretation.** At this stage Riley suggests that one should test the reliability of interpretations by inviting another researcher to become a second analyst. He states that this strategy ensures that the findings reflect the thoughts and feelings of the participants and not solely the researcher. Further discussions were held with the participants concerned as a means to control subjectivity and ensuring

that their views have been reflected correctly. In addition, an independent researcher was involved during the process of data analysis and interpretation of inferences checked.

REPORT OF FINDINGS AND DISCUSSION

Simulation of real life situation

When asked to comment whether the PSCH reflects real life situation, ten teachers, eight clinical nurses and 74 students (77% n=118) agree that it (PSCH) does. Quotes were chosen to illustrate the points that respondents made, and these include statements that disagree, or were at odds with the main responses. Respondents' comments focused on how the test appears; and whether it reflects nursing practice and competencies. Their interview responses are categorised as follows:

Test appearance: The following comments are chosen as these illustrate some of the views held by the informants about the depiction of the 'real-life' situation:

"I like the PSCH, I see it as clinically orientated, they are asking about clinical skills and about what one is doing in clinical practice". (T7)

"Unlike traditional methods, like essays and objective tests, the PSCH is more like what goes on in the clinical environment". (CN3).

"Although the situations are all artificial, they are very like the situations that you are likely to come across on the ward" (ST47).

The practice of nursing:

"The fact that the PSCH makes use of the patient allocation system, suggests that one has to give consideration to planning and care delivery that is based on assessment of needs and what one perceives as the priority". (T4)

“ If patient allocation and care planning, for instance, are perceived as key functions of the nurse's role in the clinical environment, then, as far as I am concerned, the PSCH replicates the 'real-life' situation.” (CN8)

“Since the PSCH test is about the care management of a group of patients during a span of duty and given the fact that it moves the student along a time span there is no doubt in my mind that it simulates the 'real-life' situation, after all, a valid clinical assessment is observation of the student over a time span “ (CN5)

“what I think the PSCH is aiming for, is an opportunity for the student to make written contributions of his or her role with regard to the clinical decisions that he or she would make when confronted with the situations as depicted in the PSCH, as opposed to verbal articulations as would be expected for a clinical assessment.” (T5)

Competency:

“Yes, it simulates the real-life situation, evidence of competency, in this instance, is by means of written account as opposed to verbal articulation and performance as in the case of clinical assessment.”(T9)

Page, (1978, p. 29), state that "the use of written simulations is a way of bringing aspects of the clinical field to the nurse"; the informants' comments do certainly suggest that, in so far as the PSCH is concerned, aspects of the clinical field are made available to the nurse for consideration. Their views about the simulation of the 'real-life' situation is not unreservedly supported by this sample since comments are made regarding the conflict between the 'real' and the 'ideal'. Their particular area of concern relates to the staffing situation, as depicted in the PSCH, which fifty four, (45.7% n=118) respondents, (42 students, 6 teachers and 6 clinical practitioners), suggest bears little resemblance to the real situation. The informants point out that it is very rare, indeed, for the staffing skill mix to be as such since clinical staff are *“consistently working under restrained resources” (T7).*

The number of students, (43% n=98), who indicated that they did not think that the PSCH

simulates the ward situation is significant. Their main reason was the unrealistic staffing levels and work load. They indicated that the staffing level was exceptionally good and idealistic in the PSCH and as a consequence patient allocation was perceived as unrealistic, too, because, in the real situation, they would have more patients to look after.

Teachers and clinical nurses were made aware of students' observations relating to staffing levels and work load. They were asked if they thought the patient allocation relating to the PSCH should be increased. All eighteen agreed that a scenario of five or six patients/clients is adequate. The following are suggestions made by some participants:

“it would be unwise to increase the number of allocated patients since an examination should really provide the candidate with the best possible condition” (T1).

the fact that the skill mix and patient allocation appear so ideal in the PSCH does not necessarily mean that the PSCH is unrealistic what accounts for simulation of 'real-life' situation relates to choice of patients, the problems they present with, the scenarios depicted in the test and the tasks that the candidates have to undertake.” (T8)

A suggestion was made that one *“can live with the discrepancy that exists with skill mix and patient allocation” (T3)*, since in certain locations where one is not constrained by limited staffing resources; due to sickness and absenteeism, annual and study leave, and staff shortage; *“the real situation comes close to what one perceives as the ideal, although, this is very rare”, (CN6).*

Rather than increasing the number of allocated patients or manipulating the skill mix, all teachers suggested that the duration of the test should be lengthened, since, as they pointed

out so many students fail to complete the whole test, particularly the last question, which deals with evaluation of care. Extending the duration of the test is a suggestion that was also put forward by the students involved in the study. The latter's rationale being that cognitive level 4 questions are very demanding on time since thinking and planning require a considerable amount of time.

One significant observation made from students' responses relates to the number of students who selected the PSCH in their choice of preference relating to assessments. 91% (n=98) of students had chosen it as either first, second or third choice of preferred assessment on account of its relationship to practice. This compares favourably with short essays (71% n=98) and long essays (87% n=98). They perceive the PSCH to relate well to the work they do in the clinical environment and that it examines their abilities to assess and resolve problematic situations that require knowledge from a variety of subject areas. This suggests that they perceive the test as capable of sampling a broad range of curriculum content.

Forty three (44% n=98) of respondents from the student sample contributed comments, with reasons, for their first choice of assessment. Analysis of their comments revealed the following themes or key characteristics:

- Relationship to practice
- Identification of strengths and weaknesses
- Span of curriculum
- Relationship between theory and practice
- Demonstration of knowledge and understanding at different levels
- Depth and breadth of exploration and freedom of expression

- Problem solving.

Figure 8.1

STUDENTS' PREFERRED CHOICE OF ASSESSMENT			
Frequency of reference to identified themes when commenting on reasons for first choice			
	PSCH	Long Essay	Short Essay
Relationship to practice	11	1	0
Identification of strengths & weaknesses	2	0	1
Span of curriculum	7	0	0
Relationship between theory & Practice	1	0	0
Demonstration of knowledge & understanding	2	2	5
Depth & breadth of exploration	0	3	0
Problem solving	10	0	0

The above table illustrates the number of times that themes have been referred to by the 43 respondents when commenting on reasons for choosing either the PSCH, or long essay or short essay as their first choice. No statistical significance should be attached to this chart. It merely serves the purpose of portraying how the three assessments are perceived by some respondents regarding their potential in reflecting some of the key characteristics. The students' comments certainly indicate that the PSCH demonstrates six of the seven key characteristics whereas the other two assessments can only demonstrate two key characteristics at best.

The themes that figure predominantly from comments made about the PSCH are its relationship to practice, problem solving and its ability to assess a large span of the curriculum. The predominant theme for the long essay is the 'depth and breadth of exploration' of a subject or topic. That for the short essay relates to demonstration of

knowledge and understanding at various levels.

Construct validity

Gipps (1994, p100) argues that “performance assessment is important in educational terms for what it offers by way of enhanced validity and the opportunity to assess higher order skills; the idea is that both construct and consequential validity are high”. She goes on to say that (p. 101) “consequential validity is an important issue for performance based assessment that such tasks can be a faithful reflection of intended and important learning outcomes, and can encourage a tendency to direct teaching toward higher order skills and processes”. In considering potential consequences, it has not been possible to separate evidential from consequential justifications. The data gathered from participants certainly point to this fact.

There has been an abundance of responses relating to construct validity, since 'problem solving' was the construct that was central to this study. Much of what informants have commented upon has been in relationship to Rowntree's schema of cognitive ability and the structuring of question items in the problem solving case history paper. The ten questions of the PSCH became the focus of the discussion. An explanation of Rowntree's schema is offered in chapter 5.

Referring to the schema of cognitive skills, Rowntree (1977) states that at level 3, **(selecting)**, the student is choosing the means to a given end. At level 4, **(formulating)**, he is exercising at least some choice about the end. He goes on to suggest that level 4,

(**formulating**) represents the student making his own meanings within his structure of ideas rather than performing tricks with other people's meanings. This scheme is further elaborated by Rowntree who suggests that levels 1 to 3 relate to instructional objectives, (*those that provide the essential technical grounding*) and level four relates to expressive objectives, (*those that manifest themselves in the personal and idiosyncratic performance of the student once he has mastered enough of the technical grounding.*)

Issues relating to Formulation - cognitive level 4

A significant number of respondents (89% n=118) agreed that the PSCH lends itself favourably to the testing of problem solving skills. As a means to substantiate their observation, teachers have referred to students' answers that did not fulfill the pass criteria. One teacher observed that:

"when you are confronted with a fail paper, you have access to the thought processes that student has gone through to come up with the answers and it is so obvious that the strategy used has been inappropriate".(T6)

This view is shared by five other teachers. One informant went on to say that for her *"this suggests an element of problem solving when attempting the paper"* (T7). Another teacher observed that

"it is not so obvious that students have used problem solving skills when an answer is awarded a pass because the content does not really reveal the process that the student has gone through, it is when I am confronted with a fail answer that I am more aware of the thinking process that the student has gone through. Sometimes you can identify precisely where and at what stage of the process things appear to have gone wrong". (T10)

One teacher suggested that there is more evidence of problem solving process in students'

answers when the paper is perceived by students to be difficult. This view is summarised by the following comments,

"I thought the paper looked difficult, because some of the situations were so novel,, I really thought some of the students would have had problem completing the paper. I was mildly surprised about the logical way that some students had planned their answers .Because the students actually perceived it was difficult, they actually stopped and thought about what they were actually writing and tried to problem solve things out..... perhaps on other papers which students have perceived as easy, they have not particularly thought about what they were doing and did not problem solve" (T7).

Comments made about construct validity were specific to the particular cognitive levels of Rowntree's schema. The issues that were raised by teachers focused mainly on certain recurring questions and students' tendency towards a particular model or framework which they used for certain answers to those recurring questions. Since the PSCH test moves the student along a time span, usually a shift; and bearing in mind that one is allocated a group of approximately six patients/clients, there are two questions that keep recurring in each PSCH paper and are set at cognitive level 4. The questions include assessment, planning and organisation of work, (question 1) and evaluation, (question 10). Doubts were expressed as to whether students use problem solving skills when answering these two questions. Some respondents, (5 teachers) advocated that students merely recall facts since a 'proforma' was very much in evidence in students' answers. The five teachers argued that, since students appeared to use the 'proforma' to set out the content of the answer, this required recall only.

Respondents' views were sought regarding question 1, they were asked if they thought whether the question necessarily tests problem solving. 90% (n=98) of students agree that

one requires more than just recall to answer this question. In their view, problems encountered are novel and their resolution requires the application of logic which is perceived as the systematic way that one approaches a problematic situation from understanding to solution. The following comment captures the very essence of this systematic approach,

'because the problems demand problem solving progression in your mind, recall is only to help solve each part of the problem but would not help you solve it throughout it requires rationale, assessment and evaluation'.
(ST73)

The teachers and clinical nurses all agreed that question 1 sets out to test problem-solving. The following comments illustrate this point.

"it is checking out the ward situation, how they would organise their care. To prioritise care, would require that they sit down and think through analytically and logically". (CN9)

"To identify the various problems that the patients have requires problem solving, furthermore it is the nature and severity of the problem that determines whether one sees a patient as a priority or not." (T2)

"Recall only is not sufficient to plan care, it's their ability to sift through the various situations to determine intensity and levels of care required that are at the crux of this question ..." (CN7)

"OK, the management part of the question may require recall only, but even then you are looking at deployment of patients, you are looking at an action plan for that shift that incorporates their treatment schedules and other factors surely that requires problem solving." (CN10)

"When confronted with an answer that you decide to fail, you are suddenly aware that the process has gone wrong somewhere the student, in this instance, has missed out the essential elements of the answer. It often suggests that they lack awareness of the key issues relating to care." (T9)

There were, however, some comments which raised doubt on account of the perceived use

of a framework used by students to address question 1. One teacher had this comment to make.

"Although question 1 sets out to test problem solving, I am not entirely convinced that this is achieved. Students get wise to question 1 and they often use a set format especially when they describe the strategies used to identify priorities and deployment of resources. Where there is evidence of problem solving is when they articulate why one patient or situation is a priority as opposed to another." (T1)

One can infer from the above discussion, that question 1 is perceived as complex and cognitively challenging: as the above comments suggest, it requires synthesis, formulation, analysis, evaluation and application. This point is illustrated below:

"I do think people all arrive there perhaps via different means and you see that when you are reading the answers anyway. The answers are constructed differently they get there via different mental processes. I make that judgement because the answers are different from student to student. I certainly do think that they test more than just recalling facts. I certainly would argue that level 4 questions do get them to problem solve ... admissions and incidents that occur within the paper certainly force them to problem solve".(T2)

Comments relating to question 10, (evaluation of care), raise doubt about the ability of this item in testing problem solving. Three teachers (30% n=10) indicate that they are not and the following comments from one respondent provide some insight into why this may be perceived to be so:

"entirely convinced as there appears to be an element of 'technique' involved it would appear that as long as they are able to write it in evaluation format, it is sufficient for them to pass. The content of this answer is very dependent on the content of question 1, and often students seem to use question 1 as a cue surely that requires recall only". (T5)

This view, however, is not supported by other respondents (7 teachers and 8 clinical nurses) who argue that purely recalling facts is not adequate since, as indicated by one informant:

"students have to consider what has happened to the patients during the course of the shift. They have to give consideration to the relevance of the actions taken and how appropriate those actions have been. In addition, they have to decide whether the patients have improved or deteriorated. Surely, this is more than just recall. This requires complex mental processes". (CN6)

Question 10 has the potential to be problematic for students attempting the test as this is the last question and often students find themselves running out of time. Most answers are rather brief and in note form, an indication that insufficient time was allocated for the answer by the candidates. One suspects that insufficiency of time coupled with the brevity of content have largely contributed to the doubt that has been expressed above.

Issues relating to Selection - cognitive level 3

The PSCH has three questions that are set out to test '**selection**', which is referred to as cognitive level three in Rowntree's schema. In this instance one is looking at the application of facts and principles to solve problems. It has been customary thus far to include aspects of patient education, teaching, dealing with sensitive and emotive situations and critical or ill health, (disease) orientated situations.

Some questions, particularly those dealing with teaching and emotive situations, tend to focus on interpersonal or interactional skills in addition to dealing with teaching content

or the problem that is central to the emotive situation. Some teachers are dubious about the need for problem solving in areas concerning interactional skills, since the framework that students use tend to be repeated for 'like' questions or situations. This concern is illustrated by the following comments,

"we always have one question on the lines of communication, communication type question, the students know that what we are looking for are things like their general approach to the situation, for example, eye contact, open posture, being non-judgemental, encouraging the person to externalize feelings - all those skills that are conducive to good nurse patient relationship or as in the case of teaching, teacher - student relationship " (T4)

"I think that is certainly a pure recall question". "The other questions that come through as cognitive level 3 are usually student or patient teaching the process part of this question is mostly recall, the content part is certainly not " (T10)

"but given that we constantly remind them that they have to assess knowledge, set goals, evaluate what learning has taken place, I think all that part is just recall mind you, you could argue that all this is part of the process since you would be expected to do that irrespective of what teaching session you are doing. May be, I don't know, the actual teaching content is not recall." (T6)

As highlighted above, the interactional skills type questions, have two sets of criteria to determine a pass, process and content criteria. Judging by the comments made it is clear to see that the only cognitive skill required to answer the process part of the answer is recall of knowledge. However, not all informants (4 teachers and 5 clinical nurse - 45%, n=20) are in agreement with this observation. The following comments from one informant indicate why

"Students have to assess the situation they have to identify and understand the needs that are perceived as priorities, they then have to decide on a course of action and evaluate as they proceed - surely that requires higher cognitive

skills." (T1)

Teachers were prompted to further explore their understanding of the interactional, and or, emotive situations. They were asked to reflect on instances that have led them to fail an answer. The researcher feels the need to point out that this part of the interview needed to be focused as it has already been suggested by five informants, (teachers), that one is more aware of the thought processes, students have used, when confronted with a failed answer. It was important, therefore, to focus the attention of the informants and prompt them to articulate why they would decide to pass or fail an answer. What follows are comments that, to some extent, provide some evidence of the cognitive complexity of those questions, suggesting the recognition of the need for higher cognitive skills.

"Confronted with an emotive situation, for instance, one has to formulate a nursing diagnosis. That can only be achieved if the student has assessed the situation just using interactional skills is not enough." (T3)

"The problem has to be understood if one hopes to resolve the situation. Whatever action the student takes has to be 'need or problem focused', this is what quality of care is all about". (T8)

"To pass an answer I am looking at solutions based on the problem that has given rise to the situation the student has got to set things in context, if it is not contextualised I will not give a pass." (T10)

"Sometimes the content is correct because the principles are there, but if it is not set in context, I have no choice but to give a fail because that's blatant recall there is nothing there which would suggest that that individual has problem solved". (T1)

Issues relating to Application - cognitive level 2

The PSCH offers the students with a choice of three questions set at cognitive level 2. The

questions tend to relate to application of physiological principles, psychological principles, ethical issues, pharmacological principles, caring principles - including symptomatology and certain procedural matters, (for example - lost belonging, disappearance of an elderly/confused patient). The issues that have been raised regarding the cognitive level 2 questions revolve around the procedural matters, particularly of a management nature, which informants, teachers in particular, view as simply recalling facts. In effect the following observations seem to indicate that nearly all answers given to procedural matters

"hold the highest pass mark among level 2, especially management incidence - the watch goes missing, the patient disappears off the ward or whatever the question relies heavily on recalled knowledge, if one knows the procedure a pass is given " (T1)

"How does contacting a manager before filling in an incident form suggest that one is using application? There is so much in the answer that relies on rote learning that it is hard to see how students have problem solved." (T9)

This is a valid observation made by all the teachers as so few students have failed this question to date. The retention of this type of question would need to be given further consideration by the Board of Examiners. The criteria for passing need to be thought through carefully and there is a need to articulate what one is looking for as evidence to problem solving which should be communicated to both students and teachers. If those questions are to be retained one needs to look beyond the statement of what is perceived as the 'obvious' - the student would need to articulate why an incident form would be filled and the future implication for the patient or care institution. If safety is the only criterion that determines a pass those questions ought to be discarded from the PSCH papers.

All teachers have indicated that there are elements of problem solving with level 2 questions, particularly those relating to pharmacology, physiology and ethical/psychological principles. The reason given is illustrated by the following comments:

"those questions are always patient related, take for example a question about a drug, say a diuretic apart from knowing what a diuretic does, the student has to refer to physiological principles in order to explain the effects of this drug on the patient. Now, that really tests application of knowledge ... a jolly good question". (T5)

This comment suggests that this type of question not only samples a number of content areas but it also requires that one applies principles across subjects, for example using physiological principles to explain the effects of a drug on an individual with a cardiovascular problem or renal problem. An indication that problem solving skill is being used in this context would be demonstrated by the individual's capability to articulate the desired effects of diuresis for the patient with cardiovascular problem or the one with renal problems, the desired aim in each instance is different. To be successful at conveying understanding, reference would need to be made to symptomatology of both conditions and the physiological principles involved and it is only then that one could explain how symptoms are relieved. This capability, one assumes, would provide some evidence of how that student is likely to perform in the clinical environment, particularly about the necessary observations and the kind of explanation that the patient may be given. It gives us a measure of how safe that person is regarding the administration of drugs, which is an important aspect of the nurse's role. To some extent, therefore, a snapshot, an inference from the data, of the likely performance of that individual in the

clinical environment is given.

Viewed from students' perspectives, problem solving skills are essential if one is to be able to fulfil the requirements of the PSCH. Their views are illustrated in the following tables:

Figure 8.2

How far does the PSCH require problem-solving skills Students' responses in percentages (n=98)		
	Yes	No
Questions can be answered by means of recall only.	10%	90%
PSCH requires one to problem-solve	98%	2%
PSCH tests ability to apply theory to practice	90%	10%

Figure 8.3

Evidence of problem-solving skills when using the PSCH test Students (n-98) responses in percentages to the question: Does the PSCH require you to:		
	Yes	No
Be aware of problems arising from given situation?	97%	3%
Identify, explore and describe the problem?	92%	8%
Explain actions/solutions to help solve problems?	97%	3%
Reason why certain actions are more appropriate?	88%	12%
Evaluate the effectiveness of actions taken?	89%	11%

The figures 8.2 and 8.3 show that there is almost an unanimous agreement within the student sample regarding the need for problem solving skills when doing the PSCH.

Diagnostic value of the PSCH.

As indicated in chapter 6, one of the purposes of the PSCH concerns the teaching/learning process. The researcher postulated that the test would provide teachers with the opportunity to analyse patterns and strategies of problem solving in their students and that this would enable teachers to provide students with meaningful comments on their strengths and weaknesses. Some of the comments, (relating to cognitive level 4 of Rowntree's schema), contributed by teachers, mainly, seem to suggest that they are more aware of students' thought processes in instances when students have not fulfilled the pass criteria and when situations are perceived as 'difficult'. Although this is not perceived as a negative consequence of the test since it is important that teachers are insightful of students' cognitive difficulties it would suggest that there are positive elements as this would give teachers the opportunity to explore with students their thought processes relating to those situations which have resulted in failure. For an assessment to have a desired effect on students' learning processes, there has to be some faith in the assessment's capability at highlighting strengths and weaknesses. It was, thus, important to establish how the PSCH compares with assessments long used prior to its development. The student sample was asked to compare its performance with the short and long essays and the multiple choice questions; and the project assignment, nursing care study, nursing case history and nursing care diary. The choice of these assessment is based on the assumption that their continued use must have been due to some perceived desired effects on students' learning. The following tables, (figures 8.4 & 8.5) represent the students' responses with regard to how the PSCH compares with other assessments to highlight their strengths and weaknesses. The charts, (figures 8.6 & 8.7), portray the results when the bottom (0+1) and the upper ends (4+5) of the rating scales are collapsed.

Figure 8.4

Responses to question 2: Indicate how various methods of assessments have helped to highlight your strengths (n=98)						
0 is least and 5 is most helpful	0	1	2	3	4	5
PSCH	0	2	7	20	45	26
SHORT ESSAY	2	6	11	32	38	11
LONG ESSAY	3	2	5	20	41	29
MCQ	28	26	12	24	9	1
PROJECT WORK	4	4	7	29	45	11
NURSING CARE STUDY	2	5	21	19	37	16
NURSING CASE HISTORY	7	17	17	35	18	6
NURSING CARE DIARY	3	31	14	21	21	10

Figure 8.5

Responses to question 3: Indicate how various methods of assessments have helped to highlight your weaknesses (n=98)						
0 is least and 5 is most helpful	0	1	2	3	4	5
PSCH	0	5	12	21	35	27
SHORT ESSAY	2	10	14	31	27	16
LONG ESSAY	3	4	11	20	36	26
MCQ	23	22	22	14	10	9
PROJECT WORK	0	5	19	14	45	17
NURSING CARE STUDY	0	16	16	33	29	6
NURSING CASE HISTORY	9	29	17	31	11	3
NURSING CARE DIARY	9	34	19	16	22	0

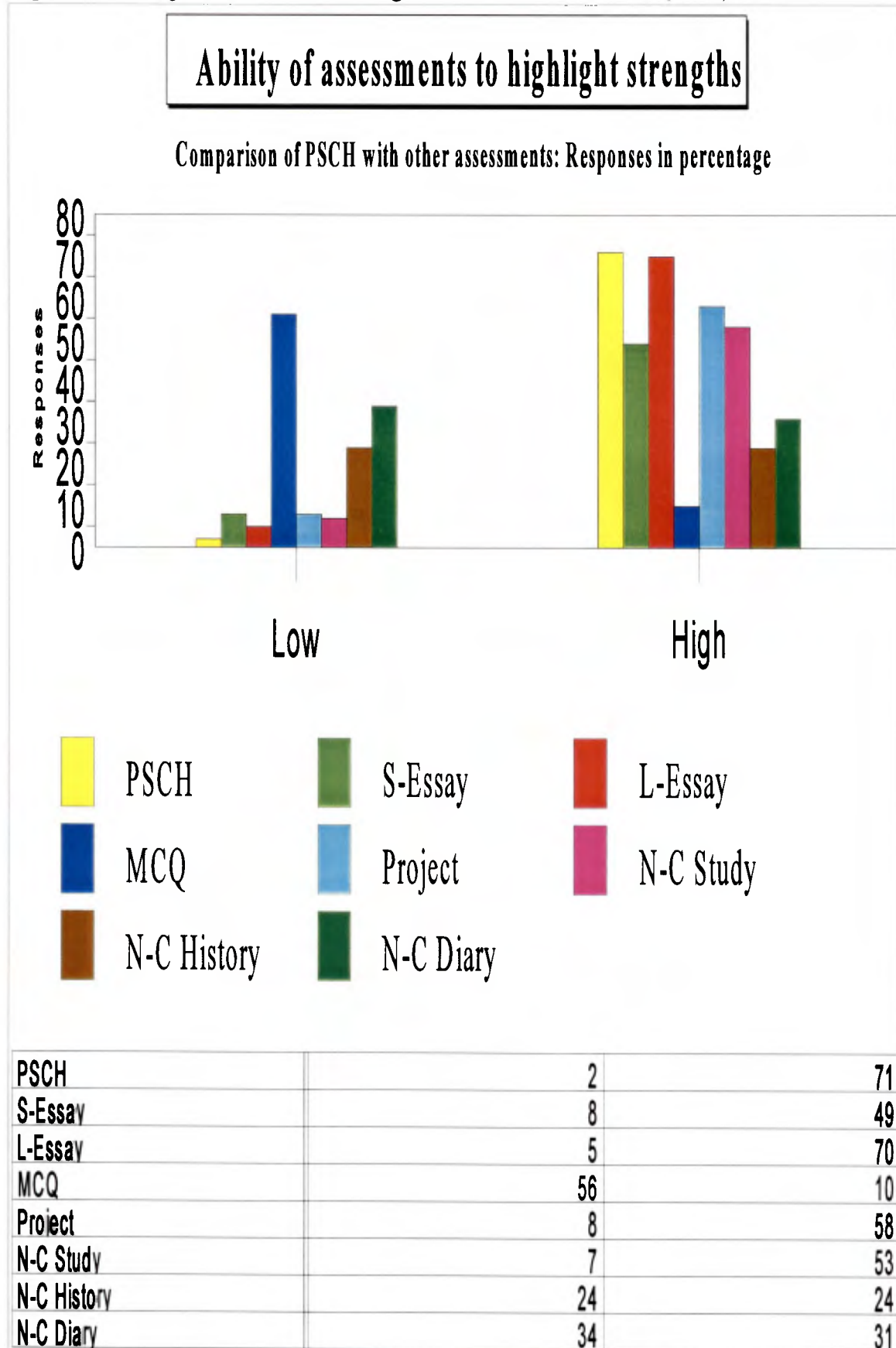
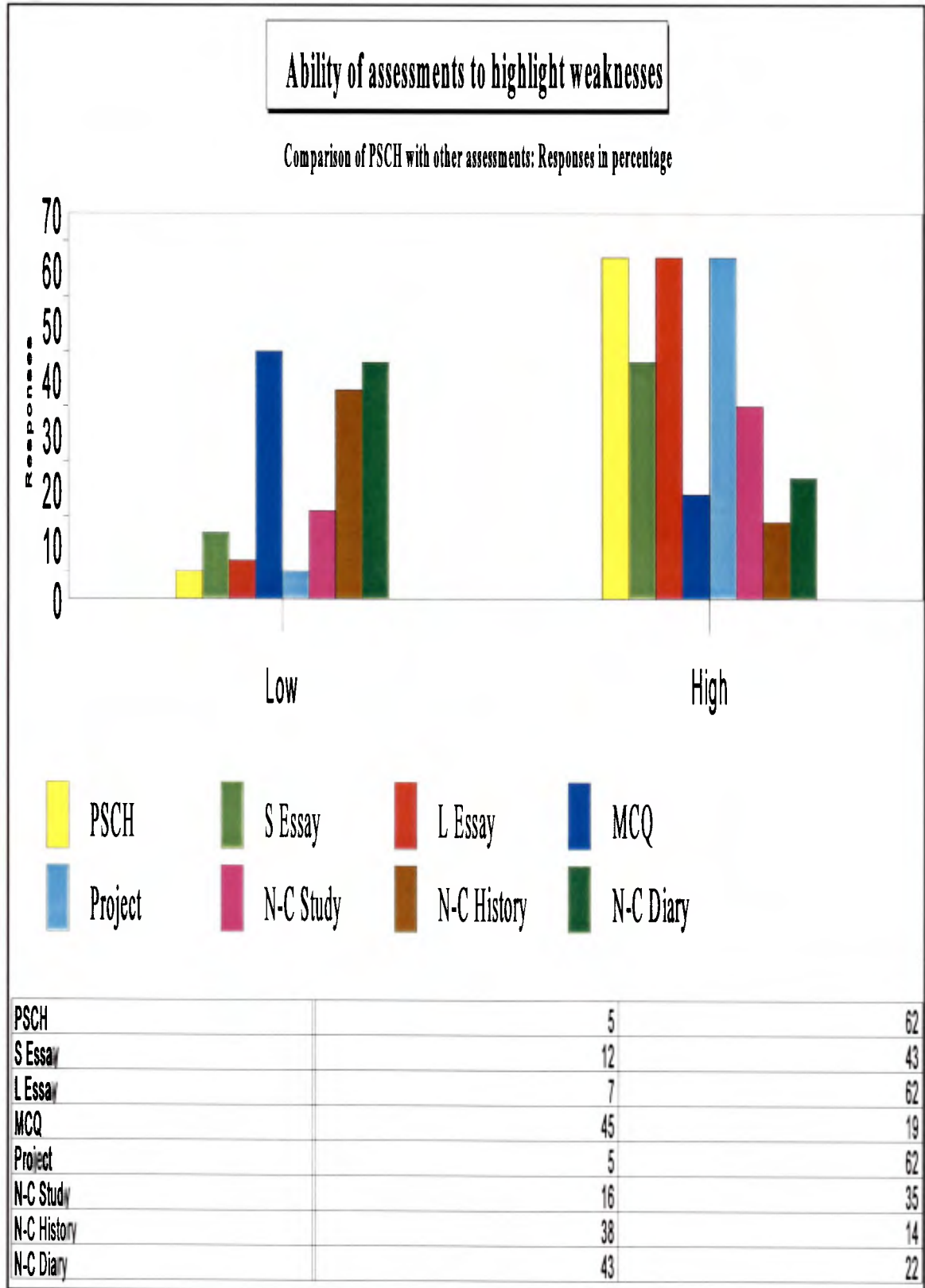
Figure 8.6 Comparison of PSCH strength with other assessments (n=98)

Figure 8.7 (n=98)



Results indicate that students rate the performance of the PSCH at highlighting their strengths and weaknesses as high as short and long essays and project work. When the bottom and upper ends of the scale are collapsed, the figures obtained indicate that the PSCH is rated as high as the long essay, (71% & 70% respectively for strengths; and 62% for weaknesses, n=98). Similar patterns are observed at the bottom end of the scale, (2% & 5% respectively for strengths and 5% & 7% respectively for weaknesses, n=98). As well as these frequency distributions, the mean and standard deviation for students' ratings for each of the assessments were calculated. The figures are displayed in figure 8.8.

Figure 8.8

Ability of assessments to highlight strengths and weaknesses Comparison of mean and standard deviations of PSCH with other assessments (Scale of 0 to 5: strongly disagree to strongly agree n=98)				
	Strengths		Weaknesses	
	Mean	Std Dev	Mean	Std Dev
PSCH	3.875	0.965	3.660	1.154
Short Essay	3.290	1.138	3.196	1.277
Long Essay	3.796	1.157	3.588	1.273
MCQ	1.622	1.402	1.948	1.621
Project	3.456	1.135	3.017	1.106
Nursing Care Study	3.339	1.214	2.937	1.162
Nursing Case History	2.571	1.309	2.171	1.294
Nursing Care Diary	2.552	1.478	2.063	1.343

What this shows is that the long essay and the PSCH are seen most positively as being able to identify strengths and weaknesses. What may account for such results may be the portrayal of the real life situation by the written simulation exercise. This seems to

indicate that the PSCH has the potential of being a good indicator of students' performance in the clinical environment, and it is on a par with the long essays.

Assessment of statutory competencies

Statutory competencies for nursing and midwifery (Rule 18 - see appendix 5) have been in place since 1983 with the introduction of the Nurses, Midwives and Health Visitors Act. These statutory requirements guide individuals as they attempt to come to an understanding of the concept of competence. Statutory definitions of competence provide a way of criterion-referencing assessment, thus ensuring that standards are met. Those statutory specifications should not be perceived as 'minimum' standards, but rather as a 'springboard' for development.

Using the specified statutory competencies as a framework, the participants, in this study, were asked if they thought the PSCH tests competencies. There was an overwhelming response with 99% (n=98) answering 'yes'. The two participants who contributed comments provide insight regarding the complexity of competence as a construct.

"Overall very good way of testing the competencies that the nurse should be familiar with at different stages of training. How you test competence will depend on where you are in the course, the speciality, the context of the work and the location".(ST32)

"It also depends on your view of what to be competent is, does it relate to doing or does it involve all the thinking that takes place whilst you are doing something." (ST7)

The comment suggests that there are different levels of competence, a view shared by Benner who postulates five stages towards expertise: novice, advanced beginner, competent, proficient, expert. The competent nurse in a novel situation relies on conscious, deliberate, analytical problem solving of an elemental nature. The expert perceives the situation as a whole, uses past concrete situations as paradigms and moves to the central region of the problem without wasteful consideration of a large number of irrelevant options, (Benner - 1983, 1983). Since the PSCH focuses on analytical problem solving, it could be argued that Benner's 'competent stage' is being tested.

Although there is an overwhelming agreement among students (97% n=98) that the PSCH tests competencies, the respondents do not hold the same view in so far as the testing of standard of care is concerned. Standard of care is not a specific competence, but is important as it provides a measure regarding the quality of care that is provided. In response to the question "Do you think that your standard of care is being tested by the PSCH?" 46% (n=98) said 'yes' and the remaining 54% (n=98) said no. What accounts for this discrepancy is the assumption, derived from participants' comments, that standard of care can only be measured in the 'real situation'.

"I feel that it is difficult to test standards of care other than in the practical situation." (ST17)

"Written work does not relate in anyway to your ability and standard of nursing care on the ward." (ST91)

"In theory, you can. But in reality you cannot judge a person's standard of care out of the ward." (ST54)

"Writing something down has no bearing to what standard of care you

actually give to your patients." (ST77)

Some comments suggest that standards of care can be measured outside the ward situation. Interaction with patients, relatives and peers, articulation of how the patient/client's psychological needs are met and the setting of priorities within the framework of the nursing process are all areas where standards can be inferred from written work.

"Yes. It tests your powers of communication and your attitudes towards patients, relatives and others." (ST6)

"It allows you to articulate how you would work on the ward and how well you use the nursing process..... It shows up if you cut corners and don't pay sufficient attention to detail." (ST22)

"Yes. What you state as 'priority' reflects your standards." (ST62)

Another factor that would account for the discrepancy regarding the PSCH ability at testing competency and standards relates to the **"ideal - real conflict"**.

"In all exam situation you always discuss the ideal situation, what you would like to do if you had the time and adequate staff - not always what you actually have time for or staff to do with in the real situation on the wards." (ST17)

"Some people could write what they should do on the ward, but whether they actually do what they say cannot be evaluated by a written examination." (ST8)

"What you write and practise on the ward may be two different things. In the PSCH you could give ideal care..... You could write what you know the examiner wants to hear, not necessarily what you would actually do in practice." (ST19)

If nursing examinations or assessments are to be valid, argue Boreham (1977), they must

be closely related to the objectives of nursing education, that is a high standard of patient care. Examinations and assessments must, therefore, reflect this goal and provide questions which test nurses' ability to apply knowledge to clinical problems. This part of the study appears to have demonstrated that the PSCH does this and goes beyond the testing of recall of knowledge. There is evidence that it is capable of testing the nurse's ability to apply his/her knowledge to clinical problems and that it goes some way to bettering written examinations in the direction advocated at the beginning of this chapter, that is, making assessments more relevant to the clinical situation and measuring the appropriate characteristics.

CHAPTER 9**RELIABILITY****INTRODUCTION**

It is argued that new performance based assessments can be designed to be so closely linked to the goals of instruction as to be almost indistinguishable from them. Performance assessments demand that assessment tasks themselves are real examples of the skill or learning goals, rather than proxies. Gipps (1994) has emphasized their support for good teaching by not requiring teachers to move away from concepts, higher order skills, in depth projects etc to prepare for the tests. In her view, performance assessments are designed to enhance construct validity and to have beneficial consequences on teaching and learning. These, however, bring questions of reliability particularly when performance assessment is used in accountability settings. Reliability, then, must be an issue for the Problem Solving Case History Test since it is being used for certification of individuals to practise as registered nurses.

RELIABILITY

Reliability is concerned with the accuracy with which a test measures the skill or attainment it is designed to measure. The underlying reliability questions, according to the psychometric paradigm, are: would an assessment produce the same or similar score on two occasions with the same subject or if given by two assessors? Reliability, thus, relates to consistency of an individual's performance and consistency in assessing that performance; in other words, replicability and comparability.

The psychometric model relies on certain standard procedures to assess the reliability of a

test. These include: giving the same test a few days apart (test-retest procedure); using alternate forms of the same test to compare performance of similar populations (parallel forms); if only one test is available or only one administration is possible then the test can be divided in half randomly and the comparability of the performance on two halves assessed (split-half procedure); an extension of this approach is a statistical analysis which averages all the possible correlations (i.e across all possible divisions of the test), giving a coefficient of internal consistency. There is also consistency of marking to be considered: agreement between raters on the same assessment task is inter-rater reliability; agreement of the same rater's judgements on different occasions is intra-rater reliability.

This traditional concept of reliability, in so far as the PSCH is concerned, is inappropriate. Gipps (1994, p. 68) indicates that "one problem with the logic of internal consistency measures is that if the assessment contains a mix of modes and contexts, so that all pupils have an optimum chance of doing well, then expecting internal consistency is unjustified". For Gipps, Shorrocks et al's. (1992) views that traditional reliability measures based on correlation techniques are likely to be misleading, hold true since they rest on the assumption of high levels of discrimination between pupils and wide variation in scoring. Since performance assessments are not designed to emphasize differences among individuals, Gipps argues that "we need to consider consistency of approach to the assessment task as well as consistency of standards in marking". Consistency of approach, she indicates, relates to the administration of the tasks and consistency of standards relates to ensuring different markers interpret the assessment criteria in the same way. This last point is perceived as necessary whenever qualitative judgements have to be made, and in particular when assessment criteria are open to various interpretations.

Consistency of approach

To ensure consistency of approach relating to the administration of the PSCH test the following procedures were set in place:

- An Item Writing Group was established comprising of clinical experts and educationists. Its primary purpose was to devise test items by using a set of guidelines for constructing the PSCH test. A grid design approach (Gipps, 1994), based on Rowntree's (1977) schema of cognitive skills; and nursing competencies as specified in the Nurses Midwives and Health Visitors Rules Approval Order (1983, No, 873), was used. This specified the range of the domain and the assessment tasks. (See appendix 1)
- All test items used for accountability purposes had to be agreed by the Examination Board. The Board's decision was guided by clinical experts and educationists. Questions were verified to ensure appropriate wording and adherence to the criteria specified in the grid design.
- All tests were administered under examination conditions: that is invigilated and conducted within a time-frame. Suggested time limits were given for each question. The higher the cognitive level, the more time was allocated for answering. Example: fifteen minutes for a question testing formulation as opposed to five minutes for a question testing application. The test requires that all questions should be attempted.
- All markers were issued with a set of scoring rubrics called marking guidelines.
- All marked scripts were submitted to a panel for moderation. Examples of work were discussed by a group of teachers, (internal and external to the school), to arrive at shared understandings of the criteria in operation. Both the processes and products of assessment were considered by the panel of moderators. This served to enhance the

consistency of judgements at the system level, (Gipps, 1994).

- Results were ratified by the Board of Examiners.

In addition to the above, all students involved were issued with assessment guidelines and time was scheduled for a teacher to provide explanations relating to the assessment format and criteria.

Consistency of standards

As indicated above, consistency of standards relates to ensuring different markers interpret the assessment criteria in the same way. Because the ratings of performance assessments depend upon professional judgements, there is a concern regarding the comparability of ratings assigned by different judges. Much of the work carried out where reliability is examined in the development of performance-based assessment has focused on the agreement of different raters. To date, there is sufficient evidence to suggest that inter-judge agreement can be high on performance assessment tasks (Dunbar, Koretz and Hoover, 1991; and Linn, 1993), but this has to be achieved through careful training of markers and the provision of scoring rubrics. To ensure consistency of standards, in so far as the PSCH was concerned, marking work-shops were organised for all teachers involved in marking and moderating the PSCH test. The purpose was to arrive at shared understandings of the assessment criteria and a consideration of both the processes and the products of the assessment.

According to Gipps (1994), if assessments are used for accountability purposes, attention needs to be paid to consistency of performance across tasks. This, she points out, is critical to the reduction of chance errors in performance assessments as there is a weight of evidence

suggesting that score reliability for performance assessments is generally low and that performance is highly task specific; that is performance on different tasks from the same domain, (or on tasks that appear to be similar), may only be moderately related. Gipps (1994 p. 105) argues that “generalizability is a particular problem for performance assessment: since direct assessments of complex performance do not generalize well from one task to another This task specificity is compounded by limited sampling from a domain and the difficulty then of generalizing from the performance to the whole domain”. To overcome these problems Linn (1993) argues that we should increase the number of tasks and ensure comprehensive coverage of the domain. Gipps has suggested that one way of dealing with the limited generalizability, which is a consistent feature of performance assessment, would be the use of a grid design approach in which the range of the domain is specified in advance and assessment tasks created to represent systematically critical dimensions. This, she argues, would ensure that tasks would sample all specified aspects of the domain and, overall, then, the performance of the domain.

Haertel (1993) has clarified the issues by pointing out that generalizability in relation to performance assessment can be viewed in terms of four levels:

- first replicable scoring of single performance (can we score a single instance of a task in a consistent way?)
- second, replicability of a specific task (does the same performance task have a constant meaning across time and places?)
- third, generalizability across tasks which are presumed to be assessing the same construct (can we generalize across parallel tasks?)

- fourth, generalizability across heterogeneous task domains (can we generalize across tasks that are not parallel?).

(Haertel, 1993 in Gipps, 1994, p. 107)

In so far as the PSCH is concerned, the first level is not problematic since scoring rubrics (marking guidelines) are issued and raters are given training. The second level, replicability of a specific task depends, according to Haertel, on three factors: First, task administration, the amount of time allowed to undertake the PSCH is specified as 3 hours and teachers are instructed as to the extent of information they should pass on to students. The second factor is the role of ancillary abilities in successful performance on the task - I do not think that this is a matter for concern regarding the PSCH: research has shown, (Meijer and Friemersma, 1986) that to solve a problem in any domain, one needs knowledge of the particular domain, but also general, linguistic and semantic knowledge. The third factor is antecedent instruction which is crucial to performance, particularly so in the assessment of higher-order skills/activities, since this always requires the transfer or application of something familiar or learnt into something new. The same task will have different meanings if it is given in different times or places following different relevant instructions. I have indicated previously that time is scheduled so that students are provided with an explanation of what the assessment entails and what the assessment criteria are. In addition, much of what students are encouraged to learn and what they are exposed to in terms of clinical learning experiences tend to focus on higher order skills.

Relating to generalisation across parallel tasks, this is heavily dependent on the involvement of ancillary abilities and on antecedent instruction, (Haertel, 1993). The latter is probably

more applicable to the PSCH for the same reasons specified for antecedent instruction above. Even in a tightly constrained situation in which parallel tasks are kept similar, Haertel argues that it is difficult to make two tasks function the same way. As for the final level, generalization across heterogeneous domains, Gipps indicates that all the evidence suggests that this is fairly unlikely: from research in cognitive psychology and cross-cultural studies comes an understanding that much expertise is domain-specific and that variations in context greatly influence performance. She points out that we are left with a serious question of coverage if we wish to generalize across domains. This point is echoed by Baker et al. (1991) who state that the aim is not to estimate and predict future performance on a construct, but in some cases is simply to credit a specific complex accomplishment in and of itself without the assumption of generalizability or prediction, as with a thesis or dissertation. Gipps concludes her discussion by indicating that “the point is not to standardize performance assessment to such an extent to achieve reliability that validity and attention to higher order skills are compromised.” What is important is “careful specification of the domain with mapping of performance assessment tasks on to it” (p. 108). This she argues makes it clear what the tasks are assessing. She summarizes the debate thus:

“Reliability needs a much more radical approach. Educational assessment does not operate on the assumption of unidimensionality many of the statistical approaches used to evaluate reliability in standardized tests are simply not appropriate. We need to drop the term reliability and instead use, comparability, which is based on consistency. The level of comparability demanded for any assessment will be related to its use Consistency leading to comparability is achieved by assessment tasks being presented in the same way to all pupils assessed; assessment criteria being interpreted in the same way by all teachers; and pupil performance being evaluated according to the same rubric and standards by all markers.”

(Gipps, 1994 p.170)

Gipps' suggestion is a move away from the psychometric model, a view echoed by Frederiksen and Collins (1989) who believe that in educational assessment we must move away from a sampling model of measurement towards a performance model 'where the quality of performance and the fairness of scoring are crucial but where the replicability and generalisability of the performance are not' (Moss, 1992, p. 250). It is for these reasons that I have concentrated on issues of consistency relating to marking in so far as the PSCH is concerned. Instead, for reasons specified above, I have not used statistical analyses involving correlations. Some statistical consideration will be given, but this will relate solely to the incidence of agreement or disagreement over judgements made of student responses.

AIM OF THIS PART OF THE STUDY

The purpose of this part of the study relates to judgement made by markers of students responses to the PSCH test. My aim is to establish if consistency of standards exists with regard to judgement made of students' work by different markers.

METHOD

Investigation into consistency of marking involved two approaches. The first approach involved an exercise to investigate inter-judge consistency. In this instance each marker was issued with scripts from six students, the scoring rubric (marking guidelines), and marking forms. They had to pass judgement on each item of the test and allocate a pass or fail grade. The second approach involved an exercise to investigate intra-judge consistency. In this instance each marker was issued with students' scripts which they had marked six months previously, the scoring rubric and marking forms. They were asked to pass judgement on each item of the test and allocate a pass or fail grade.

POPULATION SAMPLE

In all, twelve teachers were involved in this investigation, six teachers in inter-judge consistency and the others in intra-judge consistency. Markers were selected following training.

DESIGN AND PROCEDURE OF STUDY

This was fairly straight forward as markers were selected during training sessions and their consent sought. The purpose of the study was explained and they were issued with students' responses and other relevant documents. They were given a week to mark the papers and instructed to enter all results on the accompanying marking forms. All scripts and relevant documentations were then returned to me. The results were displayed in tables and inferences made relating to consistency of marking.

REPORT OF FINDINGS AND DISCUSSION

Inter-judge consistency

Results for each candidate or script were displayed in tables, (see appendix 6). Each table plots the results given by the six markers for all ten questions relating to the PSCH test for each candidate or script, (**P** denotes 'pass' and **F** denotes 'fail'). The percentage of agreement (to either pass or fail) was calculated for each item included in the test. For example, if all markers had agreed to pass or fail an item, then a 100% agreement was allocated, (agreement by five markers, 83.3%; 4 markers, 66.7% and 3 markers, 50%). Each table also provides the average of percentage relating to 'agreement' for each candidate. The mean average was calculated for each script/candidate and for each item and the results are displayed in figure

9.1.

Figure 9.1: Percentage of agreement: Breakdown of results for each script

Inter-Judge Reliability Percentage of agreement											
Cognitive Level	CL3	CL4	CL3	CL4	CL2	CL3	CL2	CL4	CL2	CL4	Mean average of agreement for each script
Test items → Scripts ↓	1	2	3	4	5	6	7	8	9	10	
1	100	83.3	66.7	100	83.3	100	50	50	83.3	100	81.7
2	100	83.3	100	66.7	66.7	50	66.7	100	100	83.3	82.07
3	100	66.7	83.3	100	100	100	100	100	100	83.3	93.3
4	83.3	83.3	66.7	66.7	100	66.7	66.7	50	100	100	78.3
5	100	83.3	100	100	66.7	100	100	100	83.3	83.3	91.7
6	100	83.3	66.7	83.3	50	66.7	83.3	83.3	100	100	81.7
Mean average of agreement for each item	97	80.5	80.5	86.1	77.8	80.6	77.8	80.5	94	91.6	

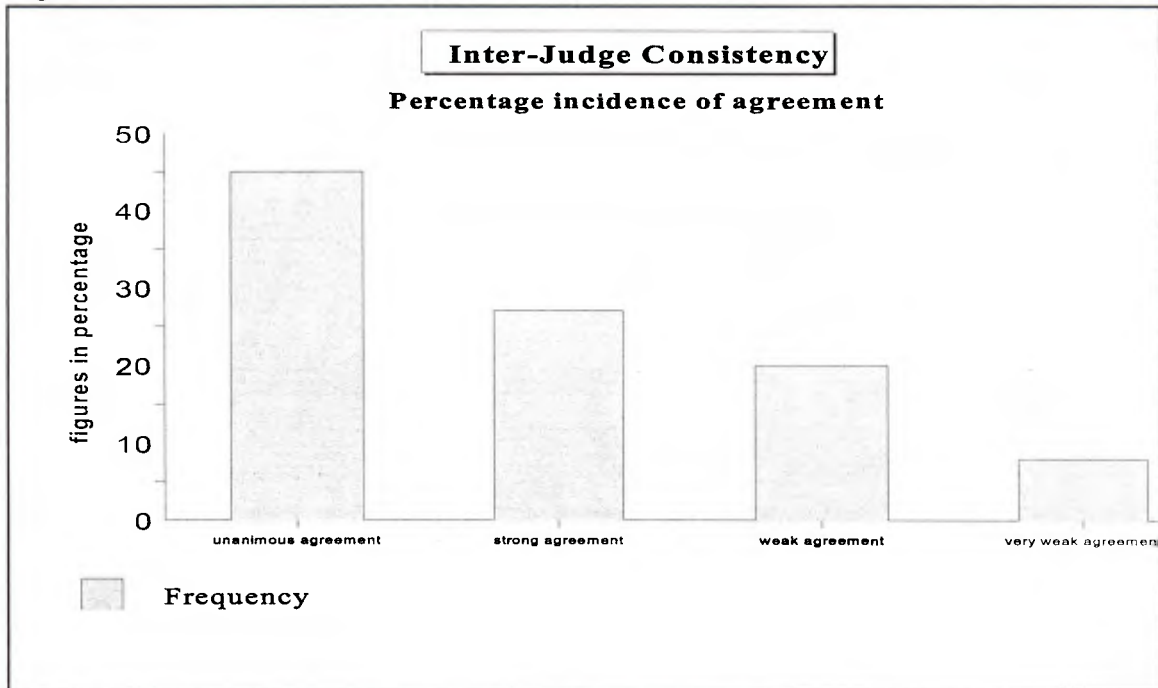
Figure 9.2. displays the frequency of times when there was 100% (unanimous) agreement 6 out of six; 83.3% (strong) agreement 5 out of 6; 66.7% (weak) agreement 4 out of 6 and 50% (very weak) agreement 3 out of 6.

Figure 9.2: Breakdown of agreement. (n=60)

Value	Frequency of times
100%(unanimous agreement) 6/6	27
83.3%(strong agreement) 5/6	16
66.7%(weak agreement) 4/6	12
50%(very weak agreement) 3/6	5

This can be represented by the following figure 9.3:

Figure 9.3



No firm conclusions can be drawn from these data. However, the figures displayed in the above chart suggest that there is a strong tendency to agree. This is quite significant since, as discussed previously, the ratings of performance assessments depend upon professional judgement. There is a temptation, here, to point out immediately that inter-judge consistency is fairly strong. One, however, runs the risk of being labelled impetuous and too quick to draw conclusions without seriously considering other factors such as:

- the influence of marking rubrics on consistency of marking,
- the test items which demonstrate the strongest agreement in marker judgement,
- the test items which demonstrate the strongest disagreement in marker judgement and,
- the cognitive levels which have demonstrated the strongest agreement and the strongest disagreement.

The strongest agreement over marking was observed in items set at cognitive level 4 (selection and formulation) and cognitive level 3 (selection and application), and the weakest agreement in items set at cognitive level 2 (application). It is probably the range of scenarios used in questions set at cognitive level 2 which accounts for the observed weakness in agreement. It is clear that cognitive level 2 needs unpacking when designing questions of this type.

Although the results obtained point to a strong agreement between markers this needed to be more thoroughly tested, the Cochran Q test was used as this provides a way of testing whether three or more matched sets of frequencies or proportions differ significantly among themselves. In addition, the Cochran Q test is particularly suitable when the data are at the nominal level. Results obtained are displayed in figure 9.4.

Figure 9.4: Cochran's Q Test for inter-rater reliability

	No of judges	No of test items	df: degree of freedom	χ^2	p	Null hypothesis
Entire test	6	60	59	160.469	0.01	Rejected
CL-2	6	18	17	56.927	0.01	Rejected
CL-3	6	18	17	36.322	0.01	Rejected
CL-4	6	24	23	47.087	0.01	Rejected

At these confidence intervals, the null hypothesis that the judges' ratings are unrelated can be rejected and there is evidence to suggest that markers, working independently, came up with similar outcomes. The figures obtained demonstrate significance in inter-rater

reliability.

INTRA-JUDGE CONSISTENCY

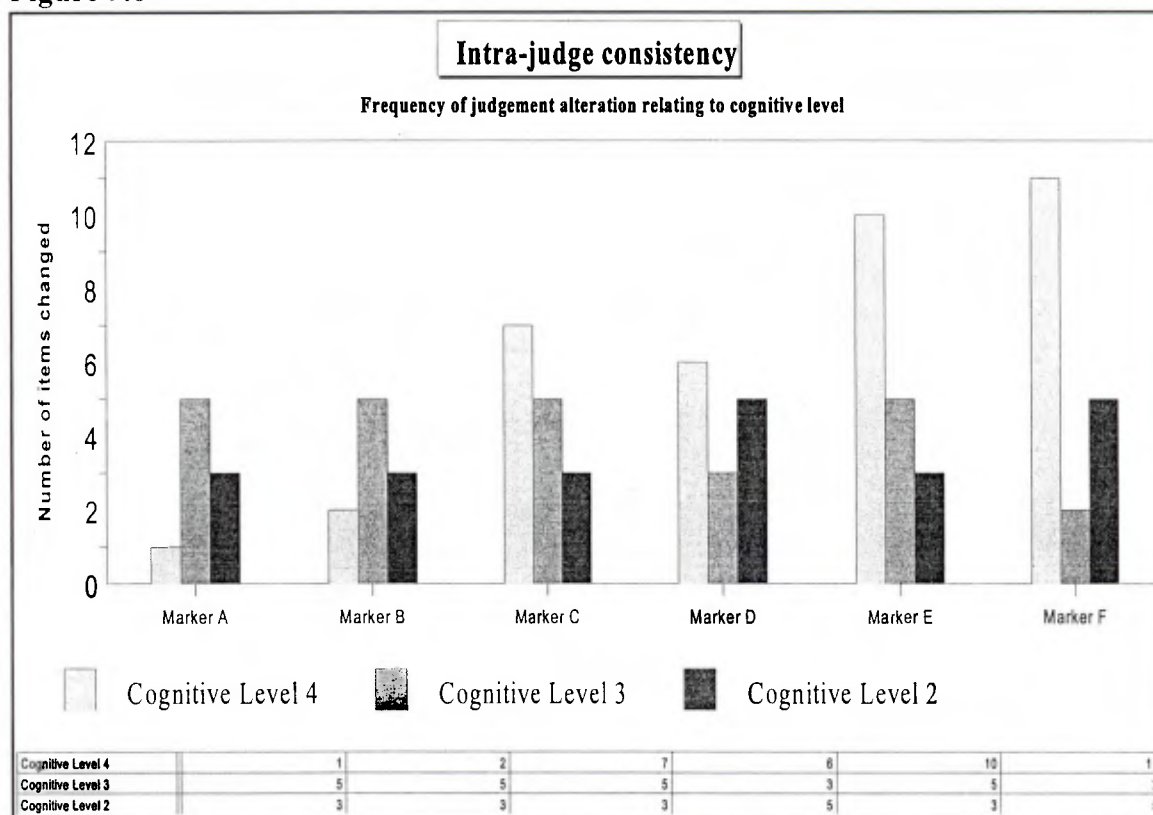
For the mark re-mark exercise, (same markers marking same scripts six months later), the test used was a Problem-Solving Case History Test and a parallel test to the one used for the inter-judge reliability case. The results for each marker were displayed in tables, (see appendix 7), and the number of times they had changed the grade on each item, either from pass to fail or vice versa, counted. The frequency of altered judgement was then calculated ($n=60$ - where 60 represents the total number of items marked by each marker). The frequency of altered judgement ranged between 15% and 30% over a period of six months. The number of items passed or failed at first marking was then compared with those at re-marking and the results are displayed in figure 9.5.

Figure 9.5: Alteration of judgement following re-marking

Markers	Judgement alteration - the whole test(N=60)				Total		Judgement alteration according to Cognitive levels (N=60)					
	pass to fail		fail to pass				CL-2		CL-3		CL-4	
	No	%	No	%	No	%	No	%	No	%	No	%
A	4	6.6	5	8.3	9	15	3	5	5	8.3	1	1.66
B	2	3.3	8	13.3	10	16.6	3	5	5	8.3	2	3.3
C	8	13.3	7	11.6	15	25	3	5	5	8.3	7	11.6
D	7	11.6	7	11.6	14	23.3	5	8.3	3	5	6	10
E	15	25	3	5	18	30	3	5	5	8.3	10	16.6
F	7	11.6	11	18.3	18	30	5	8.3	2	3.3	11	18.3

It would appear that marker A has been the most consistent and markers E and F the least consistent. The following chart, (figure 9.6), displays the frequency of times that a decision was changed at re-marking according to the level of cognitive ability being tested.

Figure 9.6



It would appear that markers C, D, E and F have had some considerable difficulties relating to items that are set to test cognitive level 4; markers A, B, C and E have had difficulties with cognitive level 3, and markers D and F have had some difficulties with cognitive level 2. We can see that the least consistency occurred in markers E and F, for questions set at cognitive level 4, markers A, B, C and E for questions set at level 3, and markers D and F for questions set at level 2. The fact that inconsistency exists between the two sets of marking: 'mark' and 're-mark' is quite obvious. Markers A, B, C and D, each had particular difficulty with one set of scripts, but markers E and F each had difficulties with five sets of scripts. The most serious problem was encountered in marker E who altered the overall grading of five scripts from pass to fail.

To test the results more thoroughly, a McNemar test for two related dichotomous variables was done. This is a nonparametric test that tests for changes in responses using the chi-square distribution. It is useful for detecting changes in “before-and-after” experimental designs. Typically a significance value less than 0.05 is considered significant. The results are displayed in figure 9.7.

Results obtained from the McNemar test, indicate that there are significant differences in results obtained for Marker E for the entire test and items marked at cognitive level 4.

One can also observe that there is poor consistency for Marker B for the entire test and items marked at cognitive level 3. The conclusion that one can draw from the results is that 2 markers were less consistent than the others and that agreement on questions set at cognitive levels 2 and 4 were more acceptable than for cognitive level 3.

There are obvious differences between the results obtained for inter-judge and intra-judge consistency. Results obtained for inter-judge consistency are more satisfactory than those obtained for intra-judge consistency, particularly when these relate to levels of cognitive ability. In so far as intra-judge consistency is concerned, the McNemar test has revealed weak consistency in items marked at cognitive level 3 for most markers; significant poor consistency for one marker (Marker E) in items at cognitive level 4; and poor consistency for one marker (Marker D) in items at cognitive level 2. In so far as Marker E is concerned, one can observe that s/he did not demonstrate consistency in excess of what others have done at cognitive levels 2 and 3, however, at cognitive level 4 ($p=0.021$) changes made from pass to fail is highly significant. So, overall, the consistency within his/her marking was weakest at cognitive level 4. Marker D had difficulty at cognitive level 4 and 2. It would appear, at level 2, except for Marker D, that the other 5 markers were consistent and at cognitive level 4, except for Marker E, the other five markers demonstrated consistency in the level of marking. It would appear that, at level 3, there were difficulties between the 'mark' and 're-mark' across all six markers. Although this is not statistically significant, it nevertheless contributes to the overall variance in so far as the whole test is concerned. It would appear that the differences observed, particularly

with Markers A, B, C and E, cummulatively contributes to a marked degree of inconsistency. This may suggest that markers were not confident in understanding the application of the marking criteria. Furthermore, what can be observed is that Marker D is an outlier with questions set at cognitive level 2 and Marker E is an outlier with cognitive level 4. What may account for the degree of inconsistency can be attributed to time factors since markers may have had more time to think about the test or it may be to do with the different forms of test used for inter-judge and intra-judge consistency. Other contributing factors are: changes in perception over time; changes in expectations relating to what constitute a pass; markers' knowledge of the test and the probable improvement in marking skills.

What was it about cognitive level 3 items that made it so problematic for markers? I believe that the wording of the question may be a contributing factor. According to the guidelines, cognitive level 3 tests the selection and application of facts and principles to solve a given problem, (What do you know that will help you solve this problem?). This follows that problems are always given and made known. There are instances, however, when problems are not made explicit for situations that are perceived as non-complicated and rather straight forward, for example, situations that depict outbursts of emotions, either as expressions of anger, or elation, or rebuke. Those scenarios depict tension and stress associated with interpersonal relationships. Problems, in emotional situations of these types, are not 'givens', but the test taker is alerted to the fact that emotional tension is present and that the problem is of a psychological nature. I suspect that there may be a possibility that markers do not share the perception of test setters or are failing to refer to guidelines, thus treating those questions as cognitive level 4 (formulating and solving own

problems). From the marker's perspective there may be an expectation that the test taker would succinctly articulate what s/he perceives the problem to be prior to rationalising the nursing actions that would be taken. If the test-taker has to re-formulate and define the problem, this would be fulfilling the criteria relating to cognitive level 4. It is highly likely, therefore, that some questions set at cognitive level 3 have been marked against cognitive level 4 criteria. In the mark, re-mark exercise, there have been 25 instances of judgement alteration either from pass to fail or fail to pass. Judgement alteration from pass to fail suggests that criteria relating to cognitive level 4 were used at re-mark and judgement alteration from fail to pass suggests that test-takers were marked against cognitive level 2 criteria, assuming that the correct criteria were used in the first round of marking. Whatever the case, there are implications for the future. To minimize this problem more thought needs to be given to the wording of questions set at cognitive level 3 so that problems are specified clearly enough to negate the need to formulate and define the problematic situation. There is also the need for frequent markers up-date and training. Any attempt to provide markers with the opportunity to share their perceptions and expectations relating to test items and criteria for marking will, in my view, help to minimize the extent of inconsistency perceived in the above exercise.

CHAPTER 10**CONCLUSION****INTRODUCTION**

Probably the single greatest change in higher education courses for the professions in the last twenty years has been the move towards problem-based approaches. In many different ways in many different places, courses have been altering to focus more on what practitioners do and less on academic disciplines (Boud, 1988). Courses are tending slowly to become primarily concerned with what students can do rather than what they know.

These changes in the conception of pre-service courses have had profound implications for assessment practices. Emphasis is placed much less on the three hour unseen examination, more on a diversity of assessment measures; less on recall of information, more on exhibiting competence; and significantly there is a shift in formative assessment towards students taking greater responsibility for assessing themselves through various structured forms of self assessment.

In nursing education the need to make assessment more aligned with life has culminated in the devolution of the assessment system which has brought with it a wave of alternative approaches to assessment. There was a realisation that assessment needed to be more generous, more complex, more closely aligned with professional practice than with individual performance measured in an antiseptic context using sanitized instruments that were untouched by human hands (Eisner, 1993). The exploration and development of the new

approaches to assessment has made some things quite clear. Assessment is not one, but several things. It performs different functions which can be related to the assessment of the programme that is provided, the quality of teaching, and outcomes that result from the interaction of the two. Eisner (1993, p. 225) states that “programme evaluation, teacher evaluation and student evaluation are the major areas of focus for any form of educational assessment”. In his view, one important realization that has emerged is that different forms of assessment are required for different functions. To help teachers understand how they perform requires a form of assessment that is fundamentally different from an approach designed to describe the general contours of student outcomes. According to Eisner, this realization is significant for it contributes to the pluralism in method and knowledge that has been developing in educational research. This growing pluralism, he argues, is likely to open up the field of assessment still further and will dramatically increase the array of data describing educational practices and its consequences.

For Eisner (1993), the new assessment practices will need to provide tasks that resemble in significant ways the challenges that people encounter in the course of ordinary living. He argues that “what counts as a measure of what students have learned in school is not what they can do in the context of school classrooms, but in the context of life outside schools.” Central to his argument is the need to understand how a student arrived at an answer as this provides a basis through which teachers might be better able to modify their programmes or alter their teaching strategies. He argues that it is important for us to know what a student considered on the way to a solution and what the student neglected since the areas of neglect can be as important in furthering the development of problem solving skills as determining whether the answer is correct.

The challenge to assessment, argues Eisner, (1993, p.227) “is to somehow create tasks that give students opportunities to display their understanding of the vital and connected features of the ideas, concepts and images they have explored. In short, the aim is to help students demonstrate that they have grasped ideas as a part of a larger field and as historically situated elements within a community of discourse”. He goes on to say that the virtues of such learning are twofold. “First it increases both meaning and retention because it allows connections between intellectual networks and thus reduces the meaningless fragmentation of bits and pieces of information. Second, as more and more of the puzzle pieces come together to provide a coherent picture of the domain to which ideas are related, the probability is increased that learning will have aesthetic features”.

Eisner (1993) states that the possession of highly differentiated schemata in some domain is one of the marks of expertise. He indicates that both ‘differentiation’, which implies the ability to notice differences in qualities, and ‘schema’, which implies some form of gestalt, give the expert the ability to see what others with less expertise miss and allow the expert to retain through a coherent schematic structure a set of tools with which to perceive, examine and comprehend the features of some domain. The challenge is whether we can in fact construct the kinds of assessment practices that will reveal the existence of such intellectual competencies. In his view, the aspiration to do so is more hopeful than an unwillingness to appreciate the intellectual and educational importance of such an ambition.

Over the last twenty years the teacher has moved centre stage as an actor in assessment rather than being a simple administrator of better tests devised elsewhere (Gipps, 1994). Many writers have made the case that assessment must be used in support of learning rather than

just indicate current or past achievement (Glaser, 1990; Goldstein, 1992; Eisner, 1991, 1993 and Gipps, 1994). Gipps (1994), advocates a more measured, analytical approach to assessment in education. Her views are summarised thus:

“We need to resist the tendency to think in simplistic terms about one particular form of assessment being better than another; consideration of form without consideration of purpose is wasted effort. We must develop and propagate a wider understanding of the effects of assessment on teaching and learning for assessment does not stand outside teaching and learning but stands in dynamic interaction with it. We need also to foster a system which supports multiple methods of assessment while at the same time making sure that each one is used appropriately. The integrity of educational assessment requires that we look at profiles of pupils’ performance across and within domains We must devise alternative ways of presenting results that do not do violence to the domain and the rich judgements made. Details of what pupils have achieved across the broad range of the domain can be provided by qualitative descriptors, or by denoting the level or grade attained within different strands or themes of the subjects and skills assessed.”

(Gipps, 1994, pp. 16)

At the back of this argument, states Gipps, is a belief that assessment on which so many resources are used should be, not only to measure, but also to inform the educational process. In her view to collapse or aggregate these levels or grades only provides a single figure for reporting is to lose detailed information. What Gipps is suggesting is that we should not just be interested in pure measurement, but be engaged in a process of interaction with students and making tentative value judgements on the basis of such interactions.

In recent years there has been a rapid transformation in assessment policies and practices.

Many of the current efforts to transform assessment have been guided by the direct assessment of complex performances. Examples include a strong push to use more open-ended problems, essays, hands-on science problems, simulations of real-world problems, and portfolios of student work. Collectively, such measures are frequently referred to as “authentic” assessments (e.g., Archibald and Newman, 1988; Wiggins, 1989) because they involve the performance of tasks that are valued in their own right. This transformation, I believe, attempts to fulfil one of the major aims of education: to enable students to use what they have learned in settings other than the ones in which they were taught. This puts a premium on the transfer of learning and it emphasizes the importance of enabling students to modify or adapt a set of ideas or skills to materials and tasks that have a resemblance to but not an identity with what was taught or studied. New approaches to assessments, thus, make it possible for students to display intelligent adaptation of the ideas they presumably learned.

The Problem-Solving Case History which is the subject of this enquiry is an attempt to address some of the issues discussed above. One of the guiding principles in its construction is that it should be closely related to what the student does in practice. This study has confirmed that it resembles the ‘real-life’ situation or event and that it appears to be more closely tied to curriculum and instruction than are typical objective tests. For what it promises, I believe that it might be used as the culminating activity of a learning unit, requiring students to consolidate and apply what they have learned as well as providing an opportunity to evaluate their learning. For reasons stated above, I believe that this assessment can be used in support of learning.

Validation of the PSCH: Issues raised.

As stated in the introductory chapter, this study concerns the validation of the Problem-Solving Case History Test, focusing on two broad areas: engagement in problem-solving activities; and testing of intra-rater and inter-rater reliability relating to marking. The methods used in this study have, I believe, gone some way to reflect adequately theoretical concepts of validity, referred to in chapter 6. 'Thought verbalization' has provided some insight regarding the cognitive complexity of the processes students employ in solving assessment problems and the meaningfulness of the problems for students and teachers. This has also provided some indication of how faithful the PSCH is in reflecting the intended and important learning outcomes. To get at consequential validity 'semi-structured' interviews and questionnaires involving clinicians and teachers have been used to establish if students problem-solve. This has also provided some insight regarding the content quality and the comprehensiveness of the content coverage. Reliability studies have focused mainly on consistency of marking by lecturers.

Consistency of marking

Results obtained suggest that there is a strong agreement between markers, (Kendall Coefficient of Concordance of .453 and $p < .001$; and Cochran's Q Test $p < 0.01$). This is in keeping with the findings of Dunbar et al., (1991); and Linn, (1993) whose own studies indicate that there is sufficient evidence suggesting that inter-judge agreement can be high on performance assessment tasks. The strong agreement between markers also suggests that the scoring rubrics may have been appropriate and in sufficient detail in informing judges as

to the standard required of students responses on the test. Equally this may suggest that the training of raters has been adequate. However, results obtained for intra-judge consistency cast doubt on the adequacy of raters' training, given the 15% to 30% range in the frequency of altered judgement over a period of six months. This also raises doubt as to whether raters had used marking rubrics as a guide when re-marking students' scripts.

I believe that training of markers must not be a 'one-off event', but must be structured in such a way as to provide regular updates on skills. This is essential if we are to maintain consistency in marking. Relating to the PSCH, the marking procedure involves judges marking a set number of scripts which are despatched to an internal moderation panel following marking. Thereafter, scripts are sampled and moderated externally followed by ratification of results by the Board of Examiners. I believe that a consideration of 'paired marking' should be explored, that is, marking undertaken by two individuals through dialogue and face to face interaction. 'Paired-marking' would, I suggest, encourage the use of scoring rubrics, thus ensuring inter-judge consistency early on in the marking process. This could also be used as an additional means to train markers who are less experienced. I understand the implication this places on teacher work-load, but accept the fact that better consistency is worth pursuing as this adds to the currency of the assessment system.

Referring to the 15% to 30% range in the frequency of altered judgement, a 'pass' may have been qualified as a 'fail' given the passage of time. This is a serious issue for performance-based assessments and this raises questions as to their use for accountability purposes. In conjunction with other assessments, the PSCH is used for accountability purposes as it is used for qualification purposes for individuals to gain entry in the nursing profession. This

makes them high-stakes and the technical demands on them change dramatically. For this purpose they need to be administratively feasible, professionally credible, publicly acceptable, legally defensible and economically affordable (Baratz-Snowden quoted by Gipps, 1994). Public acceptance and legal defensibility rest on the evidence that fairness of judgement has been exercised. It is for this very reason that we need to ensure consistency in marking. I believe that we should persevere with the use of performance-based assessments even for accountability purposes, I do not believe they should be relinquished to the classroom solely as teacher assessments. Intra-judge consistency is an important issue and one needs to seriously deal with criticisms relating to fairness and consistency, (or lack of it), of judgement.

This study has highlighted the need for further training, practice and development of markers; and research. I believe that further investigation is needed in the use of marking rubrics: should these take the form of a check list or a rating scale? Check lists generally contain a long list of detailed items of adequate performance, and the rater's task is to simply check off these items. Rating scales on the other hand, generally contain fewer items, and focus more on broader issues of performance, (Van der Vleuten et al. 1991). Studies conducted in medical education by Cohen et al. (1991); Van Luijk and Van der Vleuten, (1991) suggest that performance assessment by means of rating scales is often as reliable as objectified check lists, despite the fact that the first is considered to be more subjective and the latter more objective. Research in this area would, I hope, inform us about the structure, useability and applicability of scoring rubrics.

Although this study shows high inter-rater consistency, the concerns regarding intra-judge

consistency highlights the need for further investigation to establish the extent that professional judgement is exercised in the process of marking. I believe that accurate ratings of performance assessment ultimately rests upon professional judgement, since marking rubrics are developed by a panel of professional judges. Research in this area needs to address whether marking rubrics are used to guide professional judgement or whether these are disregarded in favour of one's own knowledge base and professional judgement. I believe this to be important if our objective is to ensure consistency of marking and fairness in judgement.

Simulation of 'real-life' situation

Comments relating to whether the PSCH simulates the 'real-life' situation or event have in the main been favourable. Chapter 8 provides a detailed analysis of data obtained from participants, there are, however, some issues that warrant some discussion here. A good proportion of respondents, (79% n=116), has indicated that aspects of the clinical field are presented to the nurse for consideration. Their views about the simulation of 'real-life' situations are not unreservedly supported since comments have been made regarding the conflict between the 'real' and the 'ideal'. The area of particular concern relates to the staffing situation, as depicted in the PSCH, which fifty four, (46.5% n=116) respondents, (42 students, 6 teachers and 6 clinical practitioners), suggest bears little resemblance to the real situation. The informants point out that it is very rare, indeed, for the staffing skill mix to be as such since clinical staff are consistently working under restrained resources.

There are implications if suggestions to provide a more realistic skill mix were to be

implemented. This would necessitate extending the test to three hours; the inclusion of additional items: clinical vignettes and questions; and increasing the allocation of patients or clients. In principle, this may have beneficial effects since a broader range of items could be included, thus ensuring a broader sampling of curricular content. However, since this study has not determined the efficiency of the written simulation by measuring the time necessary for administration and marking, I believe that further investigation is needed in these areas. The PSCH, in my view is, potentially, a labour-intensive assessment, therefore greater attention needs to be given to the development of efficient data collection designs and scoring procedures.

Performance-based assessment is a 'type of testing that calls for demonstration of understanding and skill in applied, procedural, or open-ended settings' (Baker et al., 1993; p. 1210). A major characteristic of the PSCH, as revealed by this study is that it more closely resembles performance in professional real-life situations than the traditional written examinations. The written stories of patients, containing history, test results, observations, treatment and the course of illness, is a familiar learning format. These written stories can be very brief, containing just the most relevant data or they can be voluminous, containing more detailed and comprehensive information about the patients. This study has revealed that the PSCH has the potential of being a useful learning tool in that once written it is available to the student who may choose to study the problem at anytime s/he wishes and in any place that s/he desires, at any speed, for any number of times, until the problem has been understood adequately. These findings support the observations made by Barrows and Tamblyn, (1980) regarding the advantages of using written case histories. They state that "the student may choose to make the correct diagnosis, to identify the underlying mechanisms responsible for

the symptoms or the disorder or to design a treatment plan as he wishes..... He can review the problem as often as necessary. Filed away the problem is always available for future reference. Since all the elements in the patient's problem are known to the teacher, criteria for student performance with the problem can be set and appropriate reference materials for student study can be produced, collected, or cited". This would be perceived by Linn (1993) as a virtue rather than a negative consequence as associated with some high stakes uses of standardized tests.

Despite its potential as a learning tool and its flexibility in ease of use, there are some educational disadvantages. The student is not challenged to develop an initial concept from initial cues; to generate early hypotheses; or to interview or examine, using an inquiry strategy, in order to rank or verify those hypotheses, (findings highlighted by Barrows and Tamblyn, 1980). All the important patient data are provided, someone else did the clinical reasoning and made the decision as to what information to include and in what order. This is unfaithful to reality because the student is denied some of the challenges offered in a 'real' patient problem. The problem with written simulations is that the patient's appearance, manner, his response to questions are all described in words. All important observations are written down in the abstract, linear format of words. Barrows and Tamblyn (1980) warn of the limited usefulness of written simulations as these provide low motivation to students. One cautionary note arising from this study is that no matter how realistic a performance-based assessment is, it is still a simulation, and examinees do not behave in the same way they do in real life. The examinees rely almost entirely on mental imagery, (imagining what the problem is like at a given moment in time); and a fall back on similar situations that they may have encountered in the clinical situations. In so doing, the examinee relies more and more

on the application of scientific knowledge which is based on technical rationality (Schön, 1987). I do not think, and there is little evidence to suggest otherwise, that the PSCH is capable of testing the kind of knowledge which Schön describes as non-scientific and which he refers to as theory in action resulting from reflection in action. The most that this assessment can hope to achieve, in so far as Schön's, (1991) epistemology of practice is concerned, is to assess 'reflection-on-action' since a lot of examinees appear to have looked back on experiences.

I can see that, even at this very moment in time, the PSCH assessment is beginning to look dated since it has remained a written simulated exercise. I believe that more could be done to develop this assessment and bearing in mind the advances made in information technology, particularly in the areas of 'virtual-reality', which may include video clips of real patients, I believe that computer simulations of the PSCH test could go some way to make the task more life-like and so address Schön's view of 'reflection-in-action'. Currently, there are many examples of non-immersive 'virtual-reality' wards or hospitals involving mouse-controlled navigation through a three dimensional environment on a graphics monitor, stereo viewing from the monitor via stereo glasses, stereo projection systems, and others. As the technologies of virtual reality evolve, the applications of virtual reality become literally unlimited. It is assumed that virtual reality will reshape the interface between people and information technology by offering new ways for the communication of information, the visualization of processes and the creative expression of ideas, (Beier, 1999). The virtual environment can represent any three-dimensional world that is either real or abstract; and can be animated, interactive, shared, and can expose behaviour and functionality. Useful applications of virtual reality include training, education, design evaluation, architectural

walk-through, human factors and ergonomic studies, simulation of assembly sequences and maintenance tasks, assistance for the handicapped, study and treatment of phobias, entertainment and much more.

I believe that the answer in the next developmental stage of the PSCH rests with information technology and in Virtual Reality in particular since this is proving to be a valuable medium for education and training purposes. The student is able to explore a variety of interactive worlds. This approach facilitates learning through discovery (rather than presentation) and as such embodies all the benefits of experiential learning, whilst it can support and supplement more traditional classroom practices. Virtual worlds are going beyond 3D graphics and are beginning to use multimedia and multi-sensory technologies such as video, spatial-sound, speech, images, haptic and tactile feedback, and wind and heat sensation. This has led to new applications for virtual worlds in science, engineering, medicine, business, training, entertainment and arts to explore physical environments that exist remotely (telepresence), or simulated environments that do not or could not exist; to enrich existing environments (augmented realities); and to develop physical analogues for abstract quantitative and organizational data.

Augmented Reality has seen its greatest application in medicine (Garcia, 1999). Basically, augmented reality is a combination of 3D computer-generated objects and text that are superimposed onto real images and videos, all in real-time, giving the user the extra information about the real world. I believe that augmented reality has the potential of making the PSCH more real; the fact that events can be presented in real-time suggests that

examinees can be presented with elements of surprise; patients' and relatives' responses, feelings, attitudes and reactions to the health problem; and situations that impose constraints on resources.

Problem-solving

Chapter 7 provides a detailed discussion regarding the search for evidence of problem-solving strategies and the intellectual processes used in the simulated exercise, the PSCH test. Data analysis has shown that the PSCH is capable of testing knowledge at different levels of cognitive ability. There are, however, some issues that need to be addressed, and these relate to the conditions/situations that give the student the opportunity to show the ability or skill in question. Although evidence points to the use of problem-solving skills, the PSCH test has limitations in that the reasoning processes examinees are engaged in may be perceived as merely well rehearsed theoretical exercises; as indicated above, all matters relating to patients are described in words. There is, therefore, little freedom for the student in working with the problem, outside of interpreting and analysing the data presented and hypothesizing the possible underlying causes. In its current format, the PSCH offers little challenge to the student's clinical reasoning, clinical skills and interpersonal skills. Data relating to question 10, which sets out to test evaluation of care, brings into sharp focus the limitations of the PSCH. The issue of concern relates to whether one can realistically evaluate simulated care since caring, as in the case of the PSCH, entails a cognitive exercise involving mental imagery.

I believe that further research is needed to gain insight in professional artistry and how

professionals think in and on actions. More is known about measuring problem solving (judgement) capabilities when problem solving is reduced to defining the problem and ordering alternatives. Areas usually omitted, however, are problem finding and implementation of solutions.

Testing of professional competence

In so far as this study is concerned, no firm conclusions are drawn regarding the testing of competence. There are two issues to consider though: first, the ability to perform and second the quality or state of being an individual. If competence is viewed in its simplistic terms, that is, ability to perform, then the PSCH test is totally unsuitable as the examinee is not required to perform. However, if competence is conceptualised in holistic terms, that is the general attributes required of a practitioner when dealing with some underlying domains such as knowledge of critical thinking ability, there is some mileage in using the PSCH. There is some evidence that this test enables the practitioner to look back on previous experiences that come close to some of the situations depicted in the written simulation. The test provides insight with regard to the knowledge used by examinees when dealing with problematic situations. We are, however, left with questions relating to the enabling skills, (discussed above), that are believed to be crucial for success in the work world. If our aim is to get to the thought processes involved in what Schön (1991) refers to as 'reflection in action', the PSCH is unsuitable in its present format. It requires further development along the lines suggested above: a computerised version of the PSCH using augmented reality. I believe that nothing can be more motivating for students to work with real patients as work with real patients allows the student to be progressively introduced to the pressures and responsibilities

of patient care. However, patient experience often is not the best learning format in which the student can acquire knowledge and clinical skills, and may be inappropriate for assessment (Barrows and Tamblyn, 1980). If we accept this statement, then we accept to take on the responsibility to look for ways that we can best assess our students. The search, therefore, goes on.

Research Approach

This study has been ‘custom built’ and the strategies chosen in accord with the issues arising out of the debate surrounding educational measurement, (please refer to chapter 6). The methods chosen to validate the PSCH test have, I believe, been appropriate and relevant in so far as the ‘what and how’ of a validation study should include. This study, although comprehensive, is concerned with a part and not the whole of a validation process. It is nevertheless a small investigation involving one method of assessment. It has, however, been fairly intensive in so far as time and the use of human resources are concerned, and, particularly in the use of ‘thought verbalization’. If every suggestion made by the proponents of the educational movement is acted upon, the implications for validation researchers are that validation is a never ending and a potentially expensive process. I do not believe that validation should be a ‘one off’ event, but financial and resource implications should be considered, especially when an organisation involves a series of assessments and examinations when making decisions about the suitability or otherwise of individuals for professional practice. If one accepts Haertel’s, (1990) suggestion that assessments should be designed around a teacher’s actual classroom performance, the responsibility, then is on teachers to develop the necessary assessments. Along with this is the responsibility to

validate the assessments. What, then, are the implications for teachers: Are they best suited to undertake validation? Do they have the necessary skills? Would they cope with the increased workload?

It is not the scope of this study to provide answers to the above questions. We, however need to reflect on these and accept the consequences if our view of science, particularly relating to validation, is based on ‘dialogue and not monologue (Johnson, 1989).

The Study’s contribution to knowledge

Although this study started in 1991 and took the best part of ten years to complete it is still relevant today. Despite the significant changes that have taken place in nurse education an assessment which has the ability to elicit problem-solving is as relevant today as it was at the time of its development. The theory-practice gap remains a concern and attempts to bridge the gap all have some contribution to make to the body of knowledge that already exists on the topic. This study’s contribution to knowledge relates to the following:

1. **Methodological Approach To Validating The Assessment.** As indicated in chapter 6, the approach used did not conform to a particular epistemological viewpoint. The scale of the investigative challenge suggested that a variety of methods was required to gather the relevant data. This study was one of the first, in nurse education, to use both qualitative and quantitative approaches in the evaluation and validation of an assessment. Literature in nurse education suggests that there is a paucity of information regarding validation studies relating to assessments. The few studies that

have involved the validation of assessments were based on the traditional psychometric model which has been criticised for its aura of objectivity (Gipps, 1994) and its inability to allow for teaching effects, (Wood, 1986). The experience gained and the justification given for using the approach described in chapter 6 will I believe make some valuable contribution to the literature. 'Thought verbalisation', although used in various studies in nurse education, has been used almost exclusively to compare the performance of students, (e.g. diagnostic reasoning: Tanner et al., 1987; Wong and Chung, 2002), from different programmes (baccalaureate, diploma or degree) or locations (nursing school, university) of nurse education. The focus of virtually all investigations in the nursing literature based on information processing theory was to identify the cognitive strategies employed by expert and novice clinicians in deriving a diagnosis (Taylor, 2000). This study used thought verbalisation to gain access to students' mental processes with a focus on the problem-solving process.

In order to validate the assessment, the methods used ranged from thought verbalisation for problem-solving at different levels of cognitive ability, to questionnaires and interviews to elicit information about impact and value, and together with studies of inter and intra-marker reliability are an unusually wide and thorough evaluation of an assessment particularly in nurse education.

2. **Contribution to Nurse Education.** This study has established that the PSCH has the capability to elicit various aspects of the problem-solving process in student nurses. The fact that it has been found to elicit responses at different levels of Rowntree's schema of cognitive ability suggests that the PSCH has the potential to make some

valuable contribution to the evaluation of critical thinking, as this involves the cognitive skills of comprehension, application, analysis, synthesis and evaluation. Critical thinking is an essential component of precise communication, problem-solving ability, theoretical and conceptual understanding of nursing concerns, and research endeavours that advance the knowledge base of nursing. Additionally, the demonstration of critical thinking in the clinical setting is a universally expected behaviour of professional nurses engaged in practice (Kemp, 1985).

If the development of nurses' critical thinking skills is one of the aims of professional nursing education, then new approaches to nursing education are needed to prepare our nurses so that they have the ability to analyse and interpret cues, weigh evidence and respond appropriately and expeditiously to changing practical exigencies. Although the PSCH was designed as a written simulation for use as an assessment tool, I believe, that it could equally be used as a learning tool to facilitate the desired skills that are perceived to be so crucial to the professional nurse. As it is based on simulation of the real-life clinical situations it has the potential to stimulate, at least, some conscious deliberation in nursing students of what to do and how to achieve the best outcome. Nurses must use critical thinking skills to rigorously investigate and reflect on all aspects of a clinical observation or problem in order to decide on an appropriate course of action. As a learning tool, the PSCH would be closely aligned with Problem-Based Learning (PBL) to facilitate the development of critical thinking. As the PSCH presents students with problematic clinical situations through a series of clinical vignettes, it could, therefore, be used in a PBL programme. There is an added benefit to the use of the PSCH in that it depicts a ward situation involving a

group of patients or clients and moves the student through a time span involving a sequence of clinical vignettes which portray problematic situations relating to the patients, or clients in the group. The PSCH thus involves more than one situation, more than one patient and as such it presents students with the challenges they are most likely to be faced with in the clinical situation and should, in principle, facilitate the establishment of links between the different disciplines associated with nursing.

Combined with 'thought verbalisation' the PSCH may be used as a teaching tool to facilitate the development of metacognitive skills in learning. Metacognition refers to one's own knowledge about cognitive processes and knowledge that can be used to control cognitive processes (Flavell 1976). Later definitions (Brown, 1978, Flavell, 1987) have also come to incorporate active control over cognitive processes, including predicting, monitoring, coordinating and reality checking. Getting students to verbalise their thoughts as they work through the scenarios of the PSCH may be a way of enabling students to develop awareness of their thought processes, that is thinking about their own thinking. This may contribute to the development of self awareness in discovering patterns of learning; aspects of metacognition such as planning, monitoring and evaluation; knowledge and awareness of strategic behaviours and memory systems; the conditional knowledge concerning strategy usage; and self regulation. Many researchers believe that metacognition holds a great deal of promise for helping students do better. Metacognition has been linked to a wide variety of academic outcomes for students, such as better grades and performance on tests of intelligence, (Pressley et al., 1987). Researchers are continually telling teachers that they should be teaching metacognitive strategies and

behaviours to their students as metacognitive ability is crucial to learning and success in education. Compared to poor learners, good learners have a larger repertoire of strategies, are more flexible in their approach to problems, have a larger database of knowledge concerning the circumstances that make different strategies appropriate, appreciate the relationship between effort and performance, and do more strategic self-monitoring and regulation of strategy use to ensure that activities are carried out in the appropriate sequence. In short, metacognition appears to be a large component of what we consider to be intelligent behaviour. More intriguing is the fact that metacognition is a set of behaviours unlike our concept of intelligence, (Pressley et al., 1987), which is mostly considered to be a trait. This distinction implies that metacognition can be acquired and once acquired should improve academic and intellectual performance. There is experimental evidence to support this link. Researchers such as Jausovec, (1994) have demonstrated that the performance of 'average' students can be significantly improved through training those students in aspects of metacognition such as knowledge about the types of problems, strategies, and when strategies should be applied. Other experimental studies have shown that metacognitive training produces impressive improvements in exam grades, grades in future courses, student satisfaction, and retention (Volet, 1991). As a way of helping students develop metacognitive skills the strategy of using the PSCH as a teaching instrument which enables students to verbalise their thoughts would have some contribution to the development of critical thinking. Used in combination, both the PSCH and 'thought verbalisation' would, in my view, add support to problem-based learning.

Many nursing schools world wide are appreciating the potential of problem-based learning as an appropriate andragogical technique to develop nurses who can explore options, are articulate and have the capacity for developing appropriate strategies based on reflective decision making (Ryan et al., 1992; Foldevi, 1995). PBL is more a philosophy than a prescriptive methodology and aims to develop critical thinking, analytical ability, group-initiated and self-directed learning and the synthesis of knowledge and skills within the context of professional practice (Townsend, 1990; Ryan et al. 1992). In a PBL programme, thus, there is a need for assessments that reflect and complement the underpinning principles. The PSCH would, I believe, serve the need of a PBL programme both as an assessment tool and potentially as a support for learning. This study is timely in informing others who are engaged in PBL about the kind of assessment the PSCH is. I believe that this study has validated an approach to assessment which is consistent with the concepts and practice of problem-based learning. Its potential as a support for learning is recognised.

CONCLUDING REMARKS

Looking ahead, the creation of the NHSnet and better access to 'virtual worlds' means that the learner professional will have some access to electronic patient records which could be customised for learning purposes. An electronic version of the PSCH has the potential of placing the student in a virtual world and in real time. We could build on the PSCH material to make it more life-like so that emotions, reactions and responses could form a part of it. This, in my view, will help make learning more meaningful and purposeful. Indeed a recent study (Wong and Chung, 2002) has begun to evaluate the use of electronic versions of patient

simulations in diagnostic reasoning in nursing. Wong and Chung (2002) make use of the Patient Sim System which consists of three parts: a real time computerised control patient simulator, a blue box containing interface cards that are responsible for the mechanical aspects of the simulator, and a console that stores the data on various clinical parameters and responses. The Patient Sim System allows students to perform nursing procedures as if they were in real clinical situations. They can listen to the simulator's heart sounds and chest sounds, and can feel the pulsation of the carotid and radial arteries. The simulator can demonstrate various neurological responses to pain, light stimulation and movement of its arms. In addition students can talk to the simulator and it will respond verbally. Students can administer oxygen to the simulator and the gas sensor in the simulator can then produce the relevant physiological response, which is shown on the computer screen. Indeed the use of a patient simulator in the training and testing of clinical performance of anaesthetists has been documented, with high interrater reliability, (Dewitt et al., 1997; Kapur and Steadman, 1998).

For me, one of the important lessons arising from this study is about learning of oneself, the students, the teachers and their practices. In so far as nursing is concerned, both nursing education and nursing practice stand to gain if efforts at designing assessments that promote the development of critical thinking are encouraged. The PSCH test, I believe, is an example of an assessment format that holds promise to the development of critical thinking.

As a sole researcher, the task of validating the PSCH test has been enormous and challenging. I acted on the suggestions made by the proponents of the educational movement and have justified the approach used in this study. However, the task is far too big and complex for a

sole researcher, what is required for validation studies of this type is a team approach.

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ST BARTHOLOMEW SCHOOL OF NURSING & MIDWIFERY

Assessment of Theoretical Capability: Final Assessment

Assessing the Competencies.

It is important to ensure that aspects of all competencies are assessed by the examination. Please follow the guidelines below.

1. The essays assess aspects of one or more competencies, but not usually all of them. Please mark on the form below which competencies are assessed by each essay. It does not matter if the essays in the same section assess the same competencies, since the students only answer one question. However, questions in the two sections should, where possible, assess different competencies.
2. The PSCH must be written so that aspects of all the competencies are assessed. Please tick the competencies on the form as the questions are written. Please note that some questions will assess more than one competency.

COMPETENCY		PSCH	PAPER ONE					
			SECTION A ESSAY			SECTION B ESSAY		
			1	2	3	1	2	3
A	Advise on the promotion of health and prevention of illness							
B	Recognise situations that may be detrimental to the health and well being of the individual							
C	Carry out those activities involved when conducting the comprehensive assessment of a person's nursing requirements.							
D	Recognise the significance of the observations made and use these to develop an initial nursing assessment							
E	Devise a plan of nursing care based on the assessment with the co-operation of the patient, to the extent that this is possible, taking into account the medical prescription							
F	Implement the planned programme of nursing care and where appropriate teach and co-ordinate other members of the caring team who may be responsible for implementing specific aspects of the nursing care.							
G	Review the effectiveness of the nursing care provided, and where appropriate initiate any action that may be required.							
H	Work in a team with other nurses and with medical and para-medical staff and social workers.							
I	Undertake the management of the care of a group of patients over a period of time and organise the appropriate support.							

GUIDELINES FOR CONSTRUCTING THE PROBLEM SOLVING CASE HISTORY**1.0. INTRODUCTION**

- " To be valid, nursing examinations must be closely related to the objectives of nursing education. Since the ultimate objective of the education of all nurses is a high standard of patient care, nursing examination must reflect this goal and provide questions which test the nurse's ability to apply her knowledge to clinical problems."

(Boreham,1977)

The Problem-Solving Case History, (PSCH), was selected as an assessment strategy because it requires abilities which are an essential part of clinical performance. It requires application of knowledge and problem-solving skills for much of what students learn is intended for application to problem situations in real life [Bloom et al 1956]. The PSCH is related to what the student would do in practice, it is based on the notion that it is realistic and that it allows the student to describe or discuss what she/he would do.

In so far as the PSCH is concerned, we are seeking a problem which will test the extent to which the individual has learnt to apply the theory in a practical way. This means that the problems should have some relation to the situations in which the student may ultimately be expected to apply the theory.

2.0. WHAT ARE WE ASSESSING?

Rowntree [1977] argues that "we should certainly be thinking about the qualities to be assessed while we are deciding how" because the very choice of one technique or another is usually to enable the display of

one kind of student ability or quality rather than another.

The PSCH, it is claimed, assesses problem-solving skills [Boreham, 1977; Munro, 1982]. The format which has been designed by this School assesses problem-solving skills through the cognitive domain mainly.

Rowntree's scheme is used as a framework, i.e.:

1. RECALLING: facts and principles [e.g. what is 'X'?).
2. APPLYING: a given or recalled fact or principle [e.g. how does 'X' help you solve this problem?].
3. SELECTING: and applying facts and principles [from all that are known] to solve problems [e.g. what do you know that will help you to solve this problem?].
4. FORMULATING: and solving own problems by selecting, generating and applying facts and principles [e.g. what do I see as the problem here and how can I reach a satisfactory solution?].

Rowntree (1977) states that Level 4 represents the student making his own meanings within his structure of ideas, rather than performing tricks with other people's meanings. He suggests that Levels 1 to 3 relate to Instructional Objectives [those that provide the essential technical grounding] and Level 4 relates to Expressive Objectives [those that manifest themselves in the personal and idiosyncratic performance of the student once he has mastered enough of the common technical grounding.

The PSCH is designed to assess aspects of each of the competencies as stated in the Nurses,

Midwives and Health Visitors Rules Approval Order 1983, No. 873.

These are stated as:

- (a) Advise on the promotion of health and the prevention of illness.
- (b) Recognise situations that may be detrimental to the health and well-being of the individual.
- (c) Carry out these activities when conducting the comprehensive assessment of a person's nursing requirements.
- (d) Recognise the significance of the observations made and use these to develop an initial nursing assessment.
- (e) Devise a plan of nursing care based on the assessment, with the cooperation of the patient, to the extent that this is possible, taking into account the medical prescription.
- (f) Implement the planned programme of nursing care and, when appropriate, teach and coordinate other members of the caring team who may be responsible for implementing specific aspects of the nursing care.
- (g) Review the effectiveness of the nursing care provided and where appropriate initiate any action that may be required.
- (h) Work in a team with other nurses and with medical and para-medical staff and social workers.
- (I) Undertake the management of the care of a group of patients over a period of time and organise the appropriate support services.

Problem-solving skills and competencies are assessed through knowledge and understanding of:

- (a) nursing concepts, principles, theories and research;
- (b) sociological and psychological concepts;

- (c) anatomy and physiology.

3.0. HOW TO ASSESS FORMAT OF PSCH

The PSCH consists of the nursing and medical histories of a small group of patients (up to 6), followed by a series of questions about each patient and the overall management of the care group. The latter may include managing the care with a junior nurse and how the student could be helped to learn certain aspects of care.

The PSCH involves the following principles:

1. A Story Line: which contains information about:

- (a) type of ward
- (b) staff complement
- (c) span of duty
- (d) deployment of other ward staff
- (e) allocated number of patients

For example:

Elmslie Ward is a mixed ward consisting of 17 male and 15 female beds. The ward caters for both medical and surgical patients. You are a staff nurse on an early duty with Sister, 1 Staff Nurse, 1 Enrolled Nurse and 3 Student Nurses. You are looking after the following patients with Student Nurse Preece, who is in her first year of training. Nurse Preece is halfway through her placement and has recently successfully attempted Part A [Aseptic

Technique] of her practical assessment.

2. Selection of the Case History

(a) The story line should be followed by profiles of 4 to 6 patients, giving an idea of:

- a range of dependencies
- length of stay
- problems [symptoms/needs/diagnoses]
- forthcoming events

Each patient is to have:

- a name
- age
- enough detail of problem and management
- statement of current status

In addition, one may have an empty bed/admission/discharge, etc.

(b) The case should involve several systems of the body, so as to present candidates with complex patterns of cases simulating clinical problems which they might meet in a ward.

(c) The patient's illness should proceed through several episodes, in order to represent a dynamic pattern of events which increases the test stimulus.

- (d) Use should be made of cases presenting rare but important clinical problems, as common situations might not possess novelty to serve as a test stimulus for assessing application.
- (e) The case history should be well documented.

The following are examples of profiles that may be used:

Miss Dorothy Buxton, a 67 year old spinster who lives with her elderly sister, was admitted to the ward three days ago for treatment of a large varicose [gravitational] ulcer. On admission she was malnourished, neglected and slightly confused. A swab has been taken for culture and sensitivity and whilst awaiting results she has been prescribed a broad spectrum antibiotic which she is receiving four times daily. She remains slightly confused.

Mr Charles Kay, aged 50 years, lives with his wife and youngest daughter in a detached house in the city suburbs. He is a managing director and is at present Chairman of the Parent/Teacher Association. He is slightly overweight and drinks and smokes moderately.

He was admitted to the ward 4 days ago, following a myocardial infarction. He has begun gradual mobilisation for about a day now and appears to be making good progress.

3. Number of Questions

The PSCH involves 10 questions across a time span, to include:

- assessment
- planning and organisation of work
- teaching
- promotion of health and prevention of ill health
- reorganisation following events [some events described or viewed as emergencies]
- evaluation of care

Each question should stand alone and any subsequent questions must not invalidate a previous answer nor must a question depend on information to be supplied later.

Of the 10 questions, THREE questions are set at Cognitive Level 2 [Application]; THREE questions are set at Cognitive Level 3 [Selection] and FOUR questions are set at Cognitive Level 4 [Formulation and Selection].

4. Use of Clinical Vignette

Each question may be preceded by a clinical vignette which contains all the essential information which a nurse would be expected to understand, interpret and act upon if she were nursing this patient.

For example: It is now 10.00 hours and you have had your mid morning break. You pay a visit to Mr Kay who informs you that he has just been seen by the doctors who appear to be happy with the progress that he is making.

He informs you that he is looking forward to being discharged and going home in the near future. He expresses concern about the recurrence of a similar attack and seeks information from you on how he can help himself to maintain his recovery.

Note: The more unpredictable the simulated clues are, the better they are, as test stimuli. Mismanagement of the case, uncommon reactions to drugs, severe or sudden constraints on the availability of equipment and a more than normal occurrence of complications are all valuable for generating items which will test students' abilities to put their knowledge to use.

To provide suitable appropriate test stimuli some of the simulated clues should exhibit some measure of unpredictability.

5. Question Structures

A case history test can be claimed to test application only if it cannot be answered by recall. Appended questions to a case history may be so worded that a correct response could be given by recalling instead of by referring to the stimulus material and applying knowledge to it. One way of overcoming this is to draft questions which are answerable without reference to the case history, for instance:

"What action would you take in the situation described above?"

Rather than:

"What action would take to improve the poor drainage from the 'T' Tube?"

For examples of questions set at various Cognitive Levels, please refer to appendix.

Note:

1. To set a question at Cognitive Level 2, the problem and solution should be given ["How does 'X' help you to solve this problem? 'X' being the solution]. Here the candidate has to apply the given or recalled fact or principle. In some instances the solution can be omitted from the stimulus as it is so obvious that the student should be able to recall it.
2. To set a question at Cognitive Level 3, the problem is given in the stimulus. In this instance, the student has to find an appropriate solution and describe how the solution helps resolve the problem [from all that is known, what do you know that; will help you to solve this problem and why?].
3. To set a question at Cognitive Level 4, a situation is described giving details of the simulated cases or occurrence of complications. In this instance, the student has to identify and explain the problem, find the appropriate solution and discuss how the solution helps to resolve the problem [what do I see as the problem here and how can I reach a satisfactory solution?].

4. Aspects of all competencies should be assessed and questions should be written accordingly. When writing the questions, mark after each question which competency(ies) are assessed and then tick off the competencies on the list in Appendix B. This will ensure that none are omitted.
5. Please tick the grid in Appendix B2 as the questions are written to ensure that the correct number of questions are written at the correct Cognitive Levels.
6. Questions are not set specifically to assess Cognitive Level 1 [Recall] since the students have to recall facts and principles in order to answer questions at Cognitive Levels 2, 3 and 4 and at the end of the course, purely recalling facts is inadequate.

REFERENCES

- Boreham, N [1977] The use of case histories to assess nurses' ability to solve clinical problems.
Journal of Advances Nursing, Vol. 2, Pages 57-66.
- Munro, M F [1982] Analysis of Problem-Solving Strategies in Nursing using written
simulations. In STEED-HENDERSON, M. : Recent Advances in
Nursing Education Churchill Livingstone.
- Rowntree, D [1977] Assessing Students : How Shall We Know Them (Harper & Row).

PROBLEM SOLVING CASE HISTORY**TIME ALLOWED: TWO HOURS****INSTRUCTIONS TO CANDIDATES**

1. The problem solving case history consists of a number of patient histories, followed by ten questions.

YOU MUST ANSWER ALL QUESTIONS

2. Twenty minutes have been allowed for reading/thinking time, which leaves you 100 minutes to write your answers. The expected time needed to answer each question is given alongside each question, but remember this is an average and you may take more or less time.
3. The level of difficulty of the question is written alongside each one.
4. Write your answers on the separate sheets of paper provided, drawing margins and numbering questions carefully.
5. Place your Examination Number on the top right-hand corner of each sheet of paper.
6. Leave a space between your answer to each question to enable you to make later additions.
7. Scrap paper is provided. If you make rough notes on the answer sheets, please put a line through them on completion of the question.
8. On completion of the examination, please put the answer sheets together in the correct order and secure with the paper clip provided. Place the question paper on top of the answer sheets.
9. **READ THE CASE HISTORIES AND QUESTIONS CAREFULLY AND ANSWER ONLY WHAT IS ASKED. NO CREDIT WILL BE GIVEN FOR IRRELEVANT MATTER.**

NOTE Knowledge and intellectual skills are assessed at the three different cognitive levels described below.

- | | |
|-----------------------|--|
| <u>Level 2</u> | 'APPLYING' a given or recalled fact or principle, (e.g. How does X help you solve this problem?). |
| <u>Level 3</u> | 'SELECTING' and applying facts and principles to solve a given problem, (e.g. What do you know that will help you solve this problem?). |
| <u>Level 4</u> | 'FORMULATING' and solving own problems by selecting, generating and applying facts and principles, (e.g. What do I see as the problem and how can I reach a satisfactory solution?). |

PROBLEM SOLVING CASE HISTORY

You are a staff nurse on a mixed medical ward on a late shift. You are on duty with a senior staff nurse and three student nurses. You are working with student nurse Claire Bush, who is on her second ward allocation. Together you are caring for the following patients.

1. Mr Tim White is a 54 year old business executive. He has been a patient on your ward for 5 weeks, following a left sided cardiovascular accident. He has a right-sided weakness, but is now able to walk short distances with the aid of a tripod. He does not smoke, drinks alcohol in small amounts, but is three stones overweight.
2. Mr Ernest Bond, a 59 year old lorry driver, has just arrived on the ward for a bronchoscopy and biopsy under local anaesthesia tomorrow morning. He is married and has three teenage children. He has smoked for over 40 years. He feels well and is on no medication, but is anxious about his possible diagnosis as this is his first time in hospital.
3. This bed is empty at the moment, but you know that your ward is “on take” for emergency admissions.
4. Mrs Edna Briggs, a widow aged 80 years, was admitted ten days ago having collapsed at home. She was very confused and disorientated on admission and her family are convinced that she will not be able to manage alone in her first floor flat following discharge. She has received treatment for congestive cardiac failure and is now stable, mentally alert and physically self-caring with minimal assistance. The occupational therapist accompanied Mrs Briggs home this morning in order to make a home assessment, and will come to the ward later today to discuss the outcome of the assessment.
5. Mrs Susan Ball, a 32 year old sales assistant, has been in hospital for five days following a pulmonary embolism. Her continuous intravenous infusion of heparin is due to be discontinued at 3 o'clock today and her Warfarin 5 mg. Is due to be given orally at 1800hrs. Susan's colour and respiration rate are normal and she sat out of bed to have her lunch. Her husband is bringing their 2 children aged 6 and 8 to visit for the first time this evening.

PROBLEM SOLVING CASE HISTORY
RGN COURSE

	Cognitive Level	Answering Time
<u>Question 1</u>	4	15 mins.
How would you manage the nursing care for this group of patients for the afternoon and evening?		
<u>Question 2</u>	4	15 mins.
When writing Mr Bond's care plan what problems might he experience following the bronchoscopy and biopsy and how would your care be planned to observe for and minimize these?		
<u>Question 3</u>	3	8 mins
The physiotherapist telephones to tell you that Mr White became very frustrated during his therapy session this afternoon and seemed upset when he left the department. As you are speaking to the physiotherapist you see student nurse Bush go to Mr White and cheerfully informs him that the porter has arrived to take him to the occupational therapy department. Mr White starts crying and shouting, saying 'I'm not going to be told by you what to do. I've had enough!'.		
What interventions would be most helpful for both Mr White and student nurse Bush.		

Question 4

4

15 mins

At 14.30hrs you are informed by the sister in the accident and emergency department that Joy Kemp, a 23 year old police constable, is to be admitted with an acute asthmatic attack. She has no previous history of asthma and is on her own and is extremely frightened.

Giving reasons, describe how you would plan to meet her physical and psychological needs until the end of the shift?

Question 5

2

5 mins

Miss Kemp has been prescribed Salbutamol 2.5 mg. Diluted with 2ml saline administered via a nebuliser.

Student nurse Bush states that she does not understand why this particular route of administration has been chosen.

With reference to physiology, explain the advantages of administering Salbutamol this way.

Question 6

3

8 mins

The occupational therapist informs you that Mrs Briggs had a satisfactory home assessment and that with some support could cope in her home. Mrs Briggs is very keen to try. Whilst you are having tea in the canteen with student nurse Bush, Mrs Briggs' daughter approaches you to 'discuss' her mother's discharge plan and is angry and distressed.

How would you manage this situation?

Question 7

2

5 mins

It is about 6 o'clock and you and student nurse Bush are about to give Susan Ball her drugs when you discover that your ward's bottles of Warfarin tablets are empty. What actions would you take in this situation?

Question 8

3

8 mins

Whilst visiting, Tim White's friend who is named as next of kin asks you what he can do to help Tim recover and prevent him having another stroke.

What information would you give to help him promote and maintain Tim's health?

Question 9

2

5 mins

At half past seven, Mrs Ball informs you that an overhead water pipe is leaking and that her bed is wet. The senior staff nurse is away having her meal break.

What action would you take to ensure the comfort and safety of the patients, staff and visitors?

Question 10

4

15 mins

How will you evaluate the effectiveness of the care you have given? What are the main points about each patient that you would handover to ensure continuity of care?

ST BARTHOLOMEW'S SCHOOL OF NURSING

STUDENTS' EVALUATION QUESTIONNAIRE RELATING TO THE PROBLEM -
SOLVING CASE HISTORY
TEST: PART OF ASSESSMENT 7.

DEAR STUDENT,

This form is designed to enable you to evaluate the use of the Problem-Solving Case History (P.S.C.H.): Part 2 of the final examinations (Assessment 7) as an assessment strategy.

Please indicate in the following sections your thoughts, findings and ideas. I would welcome any amount of constructive criticisms on any matter.

Your opinion is needed so that we may have some ideas about how the test is perceived/viewed by you, the client.

Your participation would be greatly appreciated and all communications will be treated with confidentiality.

May I thank you beforehand for your participation.

Yours sincerely,

Joe.S. Labonté

Q U E S T I O N N A I R E

PLEASE NOTE

For questions which require a yes/no answer please place a tick [✓] in the appropriate box.

SECTION A

This section relates to your experience regarding the use of a variety of assessment strategies.

1. Have you been tested by the following methods?

YES NO

Short Essays		
Long/Extended Essays		
Nursing Care Study		
Nursing Care Diary		
Nursing Case History		
Objective: Multiple Choice Test		
Objective: True/False Test		
Objective: Sampling Test		
Project assignments (Seen topic)		
Problem - Solving Case History (any type)		
(Senior P.S.C.H. Part 2 Final Examinations)		
Others (please specify).....		

2. Please use the following grading scale to indicate how various methods of assessments have helped to highlight your strengths.
(Note: A scale of 0 to 10 is used; 0 is the least helpful and 10 is the most helpful.)

	0	1	2	3	4	5
Short Essays						
Long/Extended Essays						
Nursing Care Study						
Nursing Care Diary						
Nursing Care History						
Objective: Multiple Choice Test						
Objectives: True/False Test						
Objective: Sampling Test						
Project assignments (Known/Seen topic)						
Problem-Solving Case History (Senior PSCH Part 2 Final Exams)						
Others (please specify).....						

Please place a tick in the appropriate box

3. Please use the following grading scale to indicate how various methods of assessment have helped to highlight your weaknesses.
(Note: A scale of 0 to 10 is used; 0 is the least helpful and 10 is the most helpful).

	0	1	2	3	4	5
Short Essays						
Long/Extended Essays						
Nursing Care Study						
Nursing Care Diary						
Nursing Care History						
Objective: Multiple Choice Test						
Objectives: True/False Test						
Objectives: Sampling Test						
Project assignments (Known/Seen Topic)						
Problem-Solving Case History (Senior PSCH Part 2 Final Exams)						
Others (please specify).....						

Please place a tick in the appropriate box

4. Which of the methods identified in (1) best suit you as a student?

First choice (best).....

Second choice

Third choice

Reasons for first choice:

5. In your view, how well do you think the following assessments are able to assess nurses, knowledge? Please use the grading scale, (0 is not at all, 5 is extremely well).

Short Essays

Long/Extended Essays

Nursing Care Study

Nursing Care Diary

Nursing Case History

Objective Multiple Choice Test

Objective True/False Test

Objective Sampling Test

Project assignments (Known Topic)

Problem-Solving Case History
(Senior PSCH)

Other (please specify)

0	1	2	3	4	5

Please place a tick in the appropriate box.

6. In your view, how well do you think the following assessments are able to assess nurses skills? Please use the grading scale, (0 is not at all; 5 is extremely well).

Short Essays

Long/Extended Essays

Nursing Care Study

Nursing Care Diary

Nursing Care History

Objective Multiple Choice Test

Objective True/False Test

Objective Sampling Test

Project assignments (Known Topic)

Problem-Solving Case History
(Senior PSCH)

Other (Please specify)

0	1	2	3	4	5

Please place a tick in the appropriate box.

7. In your view, how well do you think the following assessments are able to assess nurses' attitudes? Please use the grading scale (0 is not at all; 5 is extremely well)

Short Essays

Long/Extended Essays

Nursing Care Study

Nursing Care Diary

Nursing Care History

Objective Multiple Choice Test

Objective True/False Test

Objective Sampling Test

Project assignments (known topic)

Problem-Solving Case History
(Senior PSCH)

Other (please specify)

0	1	2	3	4	5

SECTION B

This section relates to the use of the senior Problem - Solving Case History Test (part 2 of Final Examination) as an assessment strategy.

8. How long is it since you have been assessed by the senior PSCH test?

Answer:

9. How were you informed of the use of the senior PSCH as an assessment strategy? Please place a tick in the appropriate box.

School's rules and regulations

Student's course handbook

Explanation by teacher in class

Explanation by teacher (individual tutorial)

Written Guidelines

10. Was the explanation given by teachers sufficient for you to understand what was expected of you?

Yes

No

If No: please suggest ways by which explanation could be made clearer by teachers.

Suggestions:

11. Did the written guidelines provide you with sufficiently clear instructions and information regarding what was expected of you?

Yes

No

If No: Please suggest ways by which written guidelines may be made clearer and provide you with better instructions.

Suggestions:

12. Do you feel that you have been adequately prepared for the senior PSCH (part 2 of final assessment)?

(i) By yourself

(ii) Your Teachers

Yes	No

If No to any of the above, please give reasons.

Reasons:

13. Do you feel that you would have liked more direction from your teacher?

Yes

No

Please give reasons:

14. Do you feel that teachers have been particularly willing and able to provide you with information about how you have been managing the PSCH?

Yes

No

If No, please give reasons:

15. Do you think that the senior PSCH simulates the clinical situation? (that is does it reflect what goes on in the ward?)

Yes

No

Comments:

16. Do you think that the PSCH tests your ability as a nurse to apply your knowledge to clinical problems?

Yes

No

Comments:

17. Do you think that the PSCH samples adequately the content of your course work?

Yes

No

Comments:

18. Do you think that the PSCH requires you to problem - solve?

Yes

No

Comments:

19. Does the PSCH test require you to

- (i) be aware of the problem/s which arise/s from a given situation?
- (ii) Identify, explore and describe the problem?
- (iii) Explain the actions/solutions that you would use to help you solve the problem/s?
- (iv) Reason why certain action or solution/s is/are more appropriate to deal with/solve the identified problem/s?
- (v) Evaluate the effectiveness of action/s taken to deal with problem/s?

YES	No

Comments:

20. Do you think that you are able to answer the questions by means of RECALL only?

Yes

No

Reasons:

21. Do you think that your standard of care is being tested by the PSCH method?

Yes

No

Comments:

22. Do you think that the PSCH is related to what you would do in practice?

Yes

No

Comments:

23. Do you think that the PSCH tests the competencies as stated in the Nurses, Midwives and Health Visitors Rules Approval Order 1983, No 873. (Please refer to attached copy)?

Yes

No

Comments:

24. Do you think that the time allocated for you to answer the required number of questions is adequate, (that is 2 hours to answer 10 questions)?

Yes

No

Comments:

25. Are there any changes you would wish to be made to the PSCH?

Yes

No

If yes, please give details:-

SECTION C

In this section you are invited to give a brief explanation of the way/s you set about how you would answer questions set at different cognitive levels. (i.e. your thought processes).

To answer questions set at cognitive levels 2,3,4. (CL-2: application, CL-3: Selection, CL-4: Formulation), I believe that I do the following. (Please answer by inserting a (✓) in the appropriate box).

	Application	Selection	Formulation
1. Aware of the problem			
2. Identify and describe the problem			
3. Break the problem down into sub problems			

	APPLICATION	SELECTION	FORMULATION
4. Search for relevant information.			
5. Analyse and synthesize the information			
6. Generate potential solutions to the identified problem/s			
7. Rationalise how the solution/s help/s resolve the problem.			
8. Check to establish if solution/action has proved suitable.			

Comments relating to Application:

Comments relating to Selection:

Comments relating to Formulation:

SECTION D

This section gives you the opportunity to make any comments about the Problem-Solving Case History (Part 2 of Assessment 7).

Comments:

Please return to:
J. S. Labonte
St. Bartholomew's School of Nursing.

Thank you.

ST BARTHOLOMEW'S SCHOOL OF NURSING.**SYLLABUS FOR THE COURSE LEADING TO REGISTRATION****AS A GENERAL NURSE (R.G.N).****COMPETENCIES OF A REGISTERED NURSE.**

The RGN course prepares individuals so that they may apply for the admission to Part 1 of the Professional Register and subsequently to practise as general nurses.

The competencies expected of a Registered Nurse are stated in Rule 18(1) of the Nurses, Midwives and Health Visitors Rules Approval Order 1983, Statutory Instrument No 873, as follows:-

- "1. Courses leading to a qualification the successful completion of which shall enable an application to be made for admission to Part 1, 3, 5 or 8 of the register shall provide opportunities to enable the student to accept responsibility for her professional development and to acquire the competencies required to:-
- a)
advise on the promotion of health and the prevention of ill health;
 - b)
recognise situations that may be detrimental to the health and well being of the individual;
 - c)
carry out those activities involved when conducting the comprehensive assessment of a person's nursing requirements;
 - d)
recognise the significance of the observations made and use these to develop an initial nursing assessment;
 - e)
devise a plan of nursing care based on the assessment with the cooperation of the patient, to the extent that this is possible, taking into account the medical prescription;
 - f)
implement the planned programme of nursing care and where appropriate teach and co-ordinate other members of the caring team who may be responsible for implementing specific aspects of the nursing care;
 - g)
review the effectiveness of the nursing care provided, and where appropriate, initiate any action that may be required;
 - h)
work in a team with other nurses, and with medical and para - medical staff and social workers;
 - i)
undertake the management of the care of a group of patients over a period of time and organise the appropriate support services related to the care of the particular type of patient with who she is likely to come in contact when registered in that part of the register for which the student intends to qualify."

TABLE:	CANDIDATE: 1	INTER-JUDGE CONSISTENCY
1	2	3
4	5	6
7	8	9
10	11	12
13	14	15
16	17	18
19	20	21
22	23	24
25	26	27
28	29	30
31	32	33
34	35	36
37	38	39
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52	53	54
55	56	57
58	59	60
61	62	63
64	65	66
67	68	69
70	71	72
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154	155	156
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238	239	240
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244	245	246
247	248	249
250	251	252
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262	263	264
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268	269	270
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286	287	288
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292	293	294
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310	311	312
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316	317	318
319	320	321
322	323	324
325	326	327
328	329	330
331	332	333
334	335	336
337	338	339
340	341	342
343	344	345
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349	350	351
352	353	354
355	356	357
358	359	360
361	362	363
364	365	366

Question No.	Cognitive Level	MARKERS						PERCENTAGE OF AGREEMENT
		A	B	C	D	E	F	
1	3	P	P	P	P	P	P	100%
2	4	P	F	P	P	P	P	83.3%
3	3	P	F	P	F	P	P	66.7%
4	4	P	P	P	P	P	P	100%
5	2	F	P	P	P	P	P	83.3%
6	3	P	P	P	P	P	P	100%
7	2	F	F	P	P	F	P	50%
8	4	F	P	P	F	F	P	50%
9	2	P	P	P	P	P	F	83.3%
10	4	P	P	P	P	P	P	100%
Average of percentage								81.7%

TABLE: CANDIDATE: 2 INTER-JUDGE CONSISTENCY

Question No.	Cognitive Level	MARKERS						PERCENTAGE OF AGREEMENT
		A	B	C	D	E	F	
1	3	P	P	P	P	P	P	100%
2	4	P	F	P	P	P	P	83.3%
3	3	P	P	P	P	P	P	100%
4	4	F	P	P	P	P	F	66.7%
5	2	F	F	P	F	F	P	66.7%
6	3	P	F	P	F	F	P	50%
7	2	F	F	P	P	P	P	66.7%
8	4	P	P	P	P	P	P	100%
9	2	P	P	P	P	P	P	100%
10	4	P	P	P	F	P	P	83.3%
Average of percentage								82.1%

Question No.	Cognitive Level	MARKERS						PERCENTAGE OF AGREEMENT
		A	B	C	D	E	F	
1	3	P	P	P	P	P	P	100%
2	4	P	F	P	F	P	P	66.7%
3	3	F	P	P	P	P	P	83.3%
4	4	P	P	P	P	P	P	100%
5	2	F	F	F	F	F	F	100%
6	3	P	P	P	P	P	P	100%
7	2	P	P	P	P	P	P	100%
8	4	P	P	P	P	P	P	100%
9	2	P	P	P	P	P	P	100%
10	4	P	P	P	P	F	P	83.3%
Average of percentage								93.3%

Question No.	Cognitive Level	MARKERS						PERCENTAGE OF AGREEMENT
		A	B	C	D	E	F	
1	3	F	P	P	P	P	P	83.3%
2	4	P	F	P	P	P	P	83.3%
3	3	F	P	P	F	P	P	66.7%
4	4	F	P	F	F	F	P	66.7%
5	2	F	F	F	F	F	F	100%
6	3	F	F	F	F	P	P	66.7%
7	2	F	P	P	P	F	P	66.7%
8	4	F	F	P	F	P	P	50%
9	2	P	P	P	P	P	P	100%
10	4	P	P	P	P	P	P	100%
Average of percentage								78.3%

TABLE: **CANDIDATE: 5** **INTER-JUDGE CONSISTENCY**

Question No.	Cognitive Level	MARKERS						PERCENTAGE OF AGREEMENT
		A	B	C	D	E	F	
1	3	P	P	P	P	P	P	100%
2	4	P	F	P	P	P	P	83.3%
3	3	P	P	P	P	P	P	100%
4	4	P	P	P	P	P	P	100%
5	2	F	F	F	F	P	P	66.7%
6	3	P	P	P	P	P	P	100%
7	2	F	F	F	F	F	F	100%
8	4	P	P	P	P	P	P	100%
9	2	P	P	P	P	F	P	83.3%
10	4	F	F	P	F	F	F	83.3%
Average of percentage								91.7%

TABLE: CANDIDATE: 6 INTER-JUDGE CONSISTENCY	
Q	1
Q	2
Q	3
Q	4
Q	5
Q	6
Q	7
Q	8
Q	9
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Q	98
Q	99
Q	100

Question No.	Cognitive Level	MARKERS						PERCENTAGE OF AGREEMENT
		A	B	C	D	E	F	
1	3	P	P	P	P	P	P	100%
2	4	P	P	P	F	P	P	83.3%
3	3	F	P	P	F	P	P	66.7%
4	4	P	P	P	F	P	P	83.3%
5	2	F	P	F	F	P	P	50%
6	3	P	F	P	F	P	P	66.7%
7	2	P	P	P	P	P	F	83.3%
8	4	P	P	P	P	P	F	83.3%
9	2	P	P	P	P	P	P	100%
10	4	P	P	P	P	P	P	100%
Average of percentage								81.7%

INTRA-JUDGE CONSISTENCY: MARKER: A												
Script	Cognitive level	CL4	CL4	CL3	CL2	CL3	CL3	CL4	CL2	CL2	CL4	F A J
	Question No	1	2	3	4	5	6	7	8	9	10	
1	Mark	P	P	P	P	P	P	F	F	P	F	
	Re-mark	P	P	P	P	P	P	F	F	P	F	
2	Mark	P	P	P	P	F	F	F	P	P	F	
	Re-mark	P	P	P	P	P	P	F	P	P	F	2
3	Mark	P	P	P	P	F	F	F	P	P	F	
	Re-mark	P	P	P	P	F	F	F	P	P	F	
4	Mark	P	F	P	F	F	P	P	P	P	F	
	Re-mark	P	F	P	P	P	P	F	F	P	F	4
5	Mark	F	F	P	P	F	P	F	P	P	P	
	Re-mark	F	F	P	P	F	P	F	F	P	P	1
6	Mark	F	F	P	P	P	F	F	F	P	P	
	Re-mark	F	F	P	P	F	P	F	F	P	P	2
Frequency of altered judgement (FAJ)					1	3	2	1	2			9

INTRA-JUDGE CONSISTENCY: MARKER: B												
Script	Cognitive level	CL4	CL4	CL3	CL2	CL3	CL3	CL4	CL2	CL2	CL4	F A J
	Question No	1	2	3	4	5	6	7	8	9	10	
1	Mark	F	P	P	F	F	P	P	P	F	F	
	Re-mark	F	P	P	F	P	P	P	P	P	F	2
2	Mark	P	P	P	P	F	F	P	F	F	F	
	Re-mark	P	P	P	P	F	P	P	F	F	F	1
3	Mark	P	F	P	P	P	F	F	F	P	F	
	Re-mark	P	F	P	P	P	P	F	F	P	F	1
4	Mark	P	P	P	F	F	P	F	F	P	F	
	Re-mark	P	P	P	F	P	P	F	F	P	F	1
5	Mark	P	P	P	F	P	F	F	F	P	F	
	Re-mark	P	P	P	P	P	F	F	F	P	F	1
6	Mark	F	F	P	P	F	F	F	P	P	P	
	Re-mark	F	P	P	P	P	F	F	F	P	F	4
Frequency of altered judgement (FAJ)			1		1	3	2		1	1	1	10

INTRA-JUDGE CONSISTENCY: MARKER: C												
Script	Cognitive level	CL4	CL4	CL3	CL2	CL3	CL3	CL4	CL2	CL2	CL4	F A J
	Question No	1	2	3	4	5	6	7	8	9	10	
1	Mark	P	F	P	P	P	P	P	P	P	P	
	Re-mark	F	P	P	P	P	F	P	P	P	P	2
2	Mark	P	P	P	P	P	P	P	P	P	F	
	Re-mark	P	P	P	P	P	P	P	P	P	P	1
3	Mark	P	F	P	F	F	P	P	P	P	F	
	Re-mark	P	F	P	P	P	P	P	P	P	F	2
4	Mark	P	F	F	P	P	P	P	F	F	P	
	Re-mark	F	F	F	F	F	P	P	F	F	P	3
5	Mark	P	F	P	P	P	P	F	P	F	P	
	Re-mark	P	P	F	P	F	P	F	P	P	P	4
6	Mark	P	P	P	P	P	P	F	P	P	P	
	Re-mark	F	P	P	P	P	P	P	P	P	P	1
Frequency of altered judgement (FAJ)		2	2	1	2	3	1			1	1	13

INTRA-JUDGE CONSISTENCY: MARKER:D												
Script	Cognitive level	CL4	CL4	CL3	CL2	CL3	CL3	CL4	CL2	CL2	CL4	F A J
	Question No	1	2	3	4	5	6	7	8	9	10	
1	Mark	P	F	P	F	P	P	P	P	P	F	
	Re-mark	P	P	P	P	P	P	P	P	P	F	2
2	Mark	P	F	P	F	P	P	P	P	P	P	
	Re-mark	F	F	F	F	P	P	P	P	P	F	3
3	Mark	P	P	P	F	P	P	F	P	P	P	
	Re-mark	P	P	F	F	P	P	F	P	P	P	1
4	Mark	P	P	P	F	P	P	P	F	P	P	
	Re-mark	P	P	P	P	P	P	P	P	P	P	2
5	Mark	P	F	P	F	P	F	P	F	P	F	
	Re-mark	F	F	P	F	P	F	P	P	P	F	2
6	Mark	P	P	P	F	F	F	P	P	P	P	
	Re-mark	P	F	P	P	P	F	P	P	P	F	4
Frequency of altered judgement (FAJ)		2	2	2	3	1			2		2	14

INTRA-JUDGE CONSISTENCY: MARKER:E												
Script	Cognitive level	CL4	CL4	CL3	CL2	CL3	CL3	CL4	CL2	CL2	CL4	F A J
	Question No	1	2	3	4	5	6	7	8	9	10	
1	Mark	P	P	P	P	P	P	P	P	P	F	
	Re-mark	F	P	P	F	P	F	P	F	P	F	4
2	Mark	P	F	P	F	F	P	F	P	P	P	
	Re-mark	F	P	P	F	F	P	F	P	P	F	3
3	Mark	P	P	P	P	P	P	P	P	P	F	
	Re-mark	F	P	P	P	P	P	P	P	P	F	1
4	Mark	P	F	F	P	P	P	P	P	P	F	
	Re-mark	F	F	P	P	F	P	P	P	P	F	3
5	Mark	P	F	P	F	F	F	P	P	P	P	
	Re-mark	F	F	F	P	F	F	P	P	P	F	4
6	Mark	P	P	P	P	P	F	P	F	P	F	
	Re-mark	F	F	P	P	F	F	P	F	P	F	3
Frequency of altered judgement (FAJ)		6	2	2	2	2	1		1		2	18

INTRA-JUDGE CONSISTENCY: MARKER:F												
Script	Cognitive level	CL4	CL4	CL3	CL2	CL3	CL3	CL4	CL2	CL2	CL4	F A J
	Question No	1	2	3	4	5	6	7	8	9	10	
1	Mark	P	P	P	P	P	P	P	P	P	P	
	Re-mark	P	P	P	P	P	P	P	P	P	P	
2	Mark	P	F	P	F	P	F	F	P	P	P	
	Re-mark	F	P	P	P	P	F	P	F	P	P	5
3	Mark	P	P	P	F	F	P	P	P	P	P	
	Re-mark	P	F	P	P	P	P	F	P	P	P	4
4	Mark	P	F	P	P	P	P	P	P	F	P	
	Re-mark	F	P	P	P	P	P	P	P	F	F	3
5	Mark	P	P	F	F	P	P	F	P	P	P	
	Re-mark	P	P	F	P	P	P	P	P	P	F	3
6	Mark	P	P	P	F	F	P	F	F	P	P	
	Re-mark	P	P	P	P	P	P	P	F	P	P	3
Frequency of altered judgement (FAJ)		2	3		4	2		4	1		2	18

Display of results relating to level 2 of cognitive ability: Application

Application: the ability to use rules and general principles in particular situations. It, therefore, requires that the respondent be able to use what s/he knows and understands in an unfamiliar or novel situation. The respondent must decide which abstractions in his or her entire repertory should be retrieved to solve a problem or answer a question. It requires the respondent to rationalize how the solution helps resolve the problem. Problems are 'givens'.

Question	Task	Criteria	No of participants who reported
Question 5: participants are informed that "Miss Kemp has been prescribed Salbutamol 2.5 mg diluted with 2 ml of saline to be administered via a nebuliser". They are also informed that student nurse Bush has indicated that she does not understand why this particular route of administration has been chosen.	They have been asked to explain the advantages of administering Salbutamol in this way with reference to physiology	Very rapid absorption via lung capillary network, Beta adrenoreceptors in muscle walls of bronchioles - sympathetic stimulation - rapid bronchodilation	5
		Very rapid absorption via lung capillary network, Beta adrenoreceptors in muscle walls of bronchioles - sympathetic stimulation - rapid bronchodilation	4
		Less side-effects than with intravenous salbutamol	3
		Answer must show that one understands that this prescription must be given	8
Question 7: participants are informed that they and Claire Bush are about to give Susan Ball her medication. They are informed that the time is 6PM and that they discover that the ward's bottle of warfarin tablets is empty	They are asked what actions they would take in this situation.	Inform Susan Ball of the cause of the delay and action that will be taken	5
		Obtain bottle of warfarin 5mgms from another ward or from doctor who has access to pharmacy	8
		Administer Mrs Ball's warfarin and record on prescription sheet.	4
		Place order for drugs for the following day	4
Question 9: participants are informed that "at half past seven, Mrs Ball informs them that an overhead pipe is leaking and that her bed is wet and that the senior staff nurse is away having her meal break"	They are asked what actions they would take to ensure the comfort and safety of the patients, staff and visitors	Organise moving of Mrs Ball's bed and changing the bed clothes	8
		Arrange to call out emergency plumber or works maintenance personnel	6
		Safety notices regarding wet floor	5
		Ensure works requisition form is completed	3

DISPLAY OF RESULTS RELATING TO COGNITIVE LEVEL 3: SELECTION

Selection: is the ability to make choices from a number of possible options. For example, how one deals with a patient having breathing difficulties would depend on what one perceives as the source of the problem. Breathing difficulty, for instance, could be of cardiac, or respiratory or haematologic origin. The student must decide, from all that s/he knows and from information provided in the vignette, what the likely source of the problem is and use and apply the general rules and principles in this particular situation. Selection incorporates both recall and application.

Question	Task	Criteria	No of participants who reported
Question 3: participants are informed that the physiotherapist has telephoned to say that Mr White became very frustrated during his therapy session and he seemed upset when he left the department. They are also informed that whilst on the phone, they see student nurse Bush go to Mr White and cheerfully informs him that the porter has arrived to take him to the occupational therapy department. At this point Mr White begins to cry and shout, saying "I'm not going to be told by you what to do. I have had enough"	The participants are asked what interventions would be most helpful for both Mr White and nurse Bush.	Allow Mr White time and or privacy to say why he is upset and or angry	7
		Suggestion that occupational therapy appointment be cancelled	2
		Notifying occupational therapy department about cancellation of appointment with reason	2
		Discussion of Mr White's rehabilitation programme with him and evaluation and resetting of goals if inappropriate	3
		Reassuring nurse Bush - explanation why Mr White was upset and give her opportunity to say how she feels about it	8
		Ask porter to go	4

<p>Question 6: participants are informed by the occupational therapist that Mrs Briggs had a satisfactory home assessment and that with some support could cope in her home. Mrs Briggs is very keen to try. They are also informed that whilst having tea in the canteen with student nurse Bush, Mrs Briggs' daughter approached them to discuss her mother's discharge and is angry and distressed</p>	<p>They are asked how they would manage the situation.</p>	<p>Adopt calm, non-judgemental approach</p> <p>Try to persuade Mrs Briggs' daughter to accompany you to the ward or an area where you can discuss the problem privately.</p> <p>Find out the cause of her distress and anger</p> <p>Discover what she feels should happen to her mother on discharge from hospital.</p> <p>Explain the results of the occupational therapy home assessment and her mother's wish to return home.</p> <p>Offer opportunities for relatives, Mrs Briggs and nursing staff to discuss the discharge plans if Mrs Briggs wishes.</p>	<p>7</p> <p>8</p> <p>5</p> <p>3</p> <p>4</p> <p>4</p>
<p>Selection</p>			
<p>Question 8: participants are informed that "whilst visiting, Tim White's friend, who is named as next of kin, asks you what he can do to help Tim recover and prevent him having another stroke"</p>	<p>They are asked what information they would give to help him promote and maintain Tim's health</p>	<p>Information about Tim's rehabilitation programme.</p> <p>Involvement with rehabilitation while in hospital and assistance and encouragement to continue on discharge.</p> <p>Psychological effect of CVA.</p> <p>Assist Tim to make a realistic assessment of his future work situation.</p> <p>Organisation/groups which may provide support and information for himself and Tim</p> <p>Importance of out-patient appointments.</p> <p>Diet: Low animal fat, advised calorie intake, low salt, target weight, diet sheets.</p> <p>Medication.</p> <p>Exercise</p> <p>Explanation of the factors that contribute to CVA</p>	<p>1</p> <p>1</p> <p>3</p> <p>3</p> <p>2</p> <p>2</p> <p>8</p> <p>2</p> <p>7</p> <p>5</p>

DISPLAY OF RESULTS RELATING TO LEVEL 4 OF COGNITIVE ABILITY: Formulating and solving own problems

<p>Formulating and solving own problems by selecting generating and applying facts and principles, (e.g. What do I see as the problem here and how can I reach a satisfactory solution?).</p> <p>This cognitive level goes beyond application and selection, it requires the production or creation of solutions or ideas rather than the recognition of appropriate relationships, products or judgements. Formulation incorporates analysis behaviour which requires that the parts of a document, plan or idea be identified or that the relationships between such parts be established. For example a care plan might be analysed to determine the relationship between nursing diagnoses and assessment data or to examine the appropriateness and consistency of short term and long term goals.</p> <p>Formulation requires the student to synthesize, which is the process of combining parts or elements from several sources to create an idea, theory, plan or structure which is new. Using assessment data to construct a patient's care plan is an obvious example, preparing a patient teaching plan is another.</p> <p>The student is also expected to evaluate, that is, making judgement about the quality or value of materials or procedures. Self imposed standards or standards generally accepted in the field are used as criteria for making judgements. Examples of evaluation include judging the appropriateness of aspects of care plans, the quality of care given to a particular patient, the feasibility of team staffing plan or the acceptability of modified procedures.</p>		
<p>Question 1: After providing the participants with profiles of four patients, Mr White, Mr Bond, Mrs Briggs and Mrs Ball, and informed that they are working with student nurse Bush, who is on her second ward allocation</p>		
<p>Criteria</p>		No of participants who reported
General points	Task: participants are asked "How would you manage the nursing care for this group of patients for the afternoon and evening?"	
	First year student nurse: supervision, teaching and allocation following assessment of priorities of care and the student's knowledge & skills	7
	Meal Breaks	3
	Check empty bed is ready for admission	8
	One patient needs admitting	3
	One patient needs observations	3
	Three patients need some help with activities of daily living	3
	Two patients being rehabilitated in preparation for their return home	3

Formulation continued: Criteria		No of participants who reported
Tim White	Continue with rehabilitation programme	6
	Liaise with and assist therapists	3
	Encourage and help with exercises	5
	Assist with activities of daily living as necessary, promote independence	6
	Reducing low fat, low salt diet	7
Ernest Bond	Admission documentation and orientate him to the ward and personnel	4
	Establish rapport and encourage him to ask questions	5
	Nursing history and care plan	5
	Information and preparation about bronchoscopy tomorrow, check his understanding	8
	Establish how she feels about the home assessment this morning	8
Edna Briggs	Continue with her rehabilitation programme	4
	Discuss results of home assessment with her when the therapist visits the ward this afternoon.	7
	Arrange to discuss the results of the home assessment with Mrs Briggs' family when they visit or telephone.	4

Susan Ball	Vital signs four hourly	3
	Fluid balance chart	3
	Intravenous infusion of heparin to be discontinued at 15.00hrs	7
	To commence warfarin at 18.00hrs	7
	Observe for bleeding	4
	Children's first visit this evening	7
Formulation continued: Question 2: refers participants to Mr Bond's care plan and asks them how they would plan their care to observe for and minimize the problems he may experience following the bronchoscopy and biopsy. This question requires the participant to undertake two clearly identified tasks: 1. the problems Mr Bond may experience following bronchoscopy and biopsy, and 2. how the care should be planned to observe for and minimize the identified problems.		
Criteria		No of participants who rereported
Aspiration pneumonia and respiratory obstruction	Nil orally for minimum of 4 hours	5
	Nil orally until cough and swallowing reflexes returned after bronchoscopy	7
	Commence fluids with small quantity of water	3
	Nurse in recovery position until sedation 'worn-off' and reflexes returned	3
	Suction apparatus available	2
	Observe respiration rate and colour half hourly until reflexes returned.	6
	Bed positioned to allow observation	2
	Observe any sputum for blood	6
Haemoptysis	Pulse and blood pressure if severe bleeding	7
Pain/sore throat	Assessment of pain	3
	Analgesia as prescribed and monitor effectiveness	5
	Comfortable positioning	3

Anxiety regarding results	Information before bronchoscopy: how long laboratory takes to report results, sedative produces amnesia, therefore will not be told of results until fully awake.	3
	Check with doctors when and what Mr Bond is told	3
	Plan time to discuss results with Mr Bond	3
Formulation continued: Question 4: informs participants that at 14.30 hours sister in the accident and emergency department notifies them that Joy Kemp, a 25 year old police constable, is to be admitted with an acute asthmatic attack. They are also informed that Joy has no previous history of asthma and is on her own and extremely frightened. (Task): They are asked to describe, (giving reasons), how they would plan to meet her physical and psychological needs until the end of the shift.		
Criteria		No of participants who rweported
Respiration	Position - sit up in bed - improve oxygenation	8
	Oxygen therapy, nebulized as prescribed (awareness of hazards)	7
	Bronchodilator as prescribed - reduce wheeze (i v or nebulizer)	8
	peak flow before and after bronchodilator - assess effectiveness of drugs	2
	Vital signs - temperature to check chest infection	3
	Respiration rate/depth/rhythm, pulse, B/P for deterioration/shock	
	Observe colour - deterioration cyanosis	2
	Observe use of accessory muscles	2
	Arrange chest physiotherapy	2
	Sputum specimen if coughing - ? chest infection	2
Nutrition	Fluid intake 2.5 litres in 24 hours - not eating/increased water loss	2
	Food only if she wishes	2
Elimination	Routine admission ward urinalysis	2
	Bedpans as needed	4
Relatives/friends	Check if informed of admission, condition and visiting times - this would reduce both Joy's and relatives/friends' anxiety	4
	Joy's use of telephone when improved	2

Anxiety regarding asthmatic attack	Information about asthma, treatment and possible cause	4
	Opportunity for Joy to express anxieties/ask questions	2
	Check if should be on duty, today/tomorrow	2
	Inform or get relatives to notify of admission	2
Formulation continued:		
Question 10: presents participants with two distinct tasks: (1) how they would evaluate the effectiveness of the care they have given, (2) the main points about each patient that they would handover to ensure continuity of care.		
Criteria		No of participants who rereported
General points	Talk to patients	6
	Discuss with Claire Bush	7
	Use care plans and charts	6
	Effectiveness of teaching/supervision of Claire Bush	2
	Leaking pipe	4
	Handling of incident with nurse Bush	7
Tim White	Emotional state now	3
	Did he attend the occupational therapy department?	2
	General progress with rehabilitation programme	3
	Was the information given to Tim's friend appropriate?	5
	Has his admission, history taking and care planning been completed?	2
	Does he understand about his bronchoscopy and biopsy tomorrow?	5
Ernest Bond	Has he settled into the ward?	2
	Is he still anxious?	4
	Have his wife and or children visited or telephoned?	2

Edna Briggs	Result of home assessment by occupational therapist	6
	Dissonance between Mrs Briggs and her daughter's views about her discharge home.	8
	Handling of incident with Mrs Briggs' daughter in the canteen	6
	General progress with her rehabilitation programme	3
Susan Ball	Was her L.v.i heparin discontinued at 3 o'clock?	6
	Has she received her Warfarin at 18.00hrs?	6
	Any bleeding?	2
	Vital signs - satisfactory?	4
	How did Susan and her children react to their first visit?	3
Formulation continued: Criteria		
Joy Kemp	Has her admission, history taking and care planning been completed?	2
	Has her asthma improved?	4
	Vital signs - satisfactory?	2
	Peak flow?	3
	Effectiveness of salbutamol	3
	Have her relatives/friends been contacted/visited?	4
	Has she settled into the ward?	2
	Does she understand about her asthma?	2
	Has a cause been established for her asthma?	2
	Is she still frightened	4

Dear Colleague,

RE: PARTICIPATION IN RESEARCH STUDY: THE ASSESSMENT OF PROBLEM SOLVING IN NURSING EDUCATION: AN EVALUATION OF A WRITTEN SIMULATION TEST.

Thank you very much for agreeing to participate in a semi - structured interview as part of my research project relating to the above.

My study has, in the main, been concerned with the following:-

1. How valid and reliable is the problem solving case history test in testing problem solving skills?
2. What should constitute a pass? What should the student achieve to decide whether he or she has passed the test?
3. How far does the problem solving case history, (PSCH), test the various competencies as specified in Rule 18 (1) of the Nurses, Midwives and Health Visitors Rules Approval Order 1983, since it, the PSCH, is also part of the final determinate examination for registration as a general nurse?
4. How content validity is ensured?
5. How inter - rater reliability is ensured?
6. How well does the PSCH simulate the real life situation or event?
7. What is the relationship between simulated performance and actual performance in the clinical setting?

To date, sufficient empirical data have been collected regarding the above. Data regarding "inter" and "intra" rater reliability have also been gathered. I have engaged eight students in an experiment or exercise which I describe as "THINKING ALOUD SESSIONS". The purpose of these sessions is to discover how students analyse a task in a qualitative way and engage themselves in problem solving activities. My intention is that the thinking aloud sessions will give me access to the type/s of cognitive styles that student nurses use when faced with a simulation written exercise that purports to reflect the "real life" situation.

Since the objectives of the professional school stress student behaviour such as understanding concepts and generalizations, critical thinking, decision making and problem solving, it follows that emphasis must be placed upon a technique to evaluate the goals of this approach in nursing education. I am interested in knowing whether the student has benefited from the specific learning experiences selected for teaching him/her how to solve problem to his/her professional concerns.

I believe that the PSCH is a tool that can measure processes more complex than the recall of facts. I suspect that, insofar as this test is concerned, arriving at the same answer may be the outcome of several different mental processes. It would, therefore, be a useful tool to appraise the thinking processes that take place in arriving at a solution to a problem, (either given as such or depicted situationally).

The purpose of the semi - structured interview is to provide us with an opportunity to explore issues raised above and for you to share your perception, which, I suspect is reality based, since, for a number of years now, you have been involved in structuring, setting, and marking or moderating the Problem Solving Case History tests.

Since it is likely that issues relating to validity and reliability may be raised during the interview, I am offering you some of the definitions that I am working from.

VALIDITY: Is the extent to which a test actually measures the entity which it was designed to measure. There are various types of validity. A test is said to have

FACE VALIDITY if the items look as if they measure the right thing.

PREDICTIVE VALIDITY if it may be used to make accurate prediction of some future performance related to the trait being measured.

CONCURRENT VALIDITY if it correlates well with other tests measuring the trait.

CONSTRUCT VALIDITY if it may be shown experimentally that it measures a particular construct.

RELIABILITY: is the extent to which a test gives consistent results. There are various methods of assessing reliability. In the **PARALLEL FORM** method, two equivalent forms of the test are constructed and administered to the same people. In the **TEST RETEST** method, the same test is given twice to the same people on different occasions. In the **SPLIT HALF** method people's scores on half the items of the test are compared to the scores on the other half.

Please find enclosed, my research proposal which I hope will set things in perspective. I hope it will provide you with insight of where I am coming from and possibly where I am heading.

Thank you very much for your help and support in this matter.

Yours sincerely,

Joseph S Labonté.

TRANSCRIPTION OF THOUGHT VERBALISATION: PART CONTRIBUTION OF ONE PARTICIPANT

1. Management of my work to day. First of all, I would look at the situation I am in. I am meant to be a staff nurse in a Medical Ward on a late shift. I have got four definite patients and one possible admission. I may start looking at my staff, there is a senior staff nurse on duty and two other students. The student who is working with me is a second warder, Claire Bush. I will start by assessing her ability. I will talk to Claire so that when we work together introduce myself if we don't already know each other. And ask her whether she has nursed any of the patients and how long she has worked on the ward and if there is a particular patient she has a good relationship with. I would make use of the information I have available in the Kardex and the care plan to find out as much as I could about the patients before I started. I would start the shift work by introducing myself to all the patients and establish if they have any immediate problems, then they should or least they should know who to ask for. I would then go through my priority of care as I have already said.

Mrs Bore:- I would check if her I.V. was running to time and I would check if she was feeling stable that there was no problem with her breathing and that does not have any undue pain and that she understood that she would be starting warfarin later on that evening and what this entails to her eventual discharge.

Mr Bond:- He is a particularly anxious man who has come to hospital for the first time. He will need general orientation to the ward and need to be fully admitted and he will need a lot of support and information about his bronchoscopy and biopsy the following day. It might be just as well to find out what he thinks is involved in the bronchoscopy and what he thinks his diagnosis might be giving him a chance to talk about his fears may help him and some of the fears may be unfounded. If he is given information regarding his bronchoscopy his anxiety will be reduced and this will also reduce any pain that he may feel post operative and also make the bronchoscopy much easier to do. Claire would probably do the admission as she is a second warder. On talking about Mr Bond's bronchoscopy, it would be a good time for Claire to learn about Bronchoscopy and its implications just as long as Mr Bond does not have two nurses sitting with him when this is being discussed.

MR WHITE:- I would have to talk to him to find out how far he has reached in his rehabilitation schedule and what sort of thing he is capable of doing by himself now. This would be a good opportunity to assess his mood as well.

MRS BRIGGS:- is rapidly becoming independent and there is the possibility of discharge in the near future, I would have to discuss this possibility with her and about how she felt about going home and whether she has any worries about going home. It says that she has had occupational therapy home assessment this morning. I would like to find out how she felt about this.

Finally I would have to make sure that the empty bed was ready for an admission.

QUESTION 2.

Mr Bond's immediate problem could involve problem with his airway as bronchoscopy could involve swelling of his airway particularly if there is any kind of blockage in his throat already, so I would have to watch him for any sign of respiratory distress, also as he had biopsy there may be the possibility of haemorrhage in which case, his vital signs would need to be closely observed. As there is a risk of part----- during the bronchoscopy Mr Bond would need to have a check X ray to ensure that this has not occurred before he is allowed anything to eat or drink. of this check X ray, it would be advisable for Mr Bond to start drinking sips of water before he would be allowed a normal fluid and dietary intake. There is also the possibility of pain following the bronchoscopy, so Mr Bond will have to be observed for signs of non verbal pain and ask whether he requires any analgesia. After he has had a bronchoscopy oral analgesia may be a difficult thing to swallow so he may need some I.M analgesia. He would have to be assessed at the time. Mr Bond is likely to be very anxious after the diagnosis after his bronchoscopy and obviously the more anxious he becomes the more painful his throat would become and the less receptive he would be to the information or treatment he is given, therefore it is important to assess that he knows

about his diagnosis and make sure that he understands what it entails.

QUESTION 3.

Mr WHITE IS OBVIOUSLY VERY UPSET about having to go to occupational therapy department and became very frustrated during his physiotherapy session and as Claire is going to ask him to go down to occupational therapy he is becoming verbally aggressive and upset. This may upset Claire as she is trying to do her best for him and he is not reacting well to this, but there may be a particular reason that Mr White became so frustrated during his physiotherapy session and obviously he is upset at this time and needs support from us, that is why he has become so angry. This will not be a good time to force him to go down to occupational therapy and I will spend some time talking to Mr White to find out why he is so upset and to see if we can give him some support. If he becomes able to go to the occupational therapy department later on then we can inform them of this but at the moment it is more important that he talks over his anxieties rather than going down for occupational therapy session. Claire will also need some support, she may not understand why he is talking to her like this and she may take it personally. But obviously we will have to contact the occupational therapist and explain why Mr White did not go down for his occupational therapy session.

QUESTION 4.

I have not got the time to go through Roper's Model of care and the activities of daily living, so I assess the priorities of care necessary for Joy Kemp. Obviously as she is having an asthma attack, her breathing is going to be a major problem, so it is important that she understands that what an asthmatic attack is and what she can do to help her stop the asthma attack and how that if she panics this can make the attack worse by tightening the spasm in the bronchioles. To help her with her breathing she needs to relax as much as possible, she has to sit upright slightly forward if she finds it comfortable. She may possibly have to take oxygen by mask or nasal speculum and she will need to take drugs, bronchodilators to relieve the spasms in her lungs. When her breathing and the oxygen level have stabilised and as Joy is an emergency admission, she may have a lot of problem at home, I would have to assess the situation and see if she wishes to have anybody contacted a next of kin or husband, or she may have arrangement made for young children at school. If she has any such problems she will not be able to relax and her asthma attack is liable to get worse. Any arrangement she needs making will have to be sorted out. Obviously I will need to keep a close eye on her in case her asthma attack worsens. She will also need a lot of help with the activities of daily living as she is breathless.

QUESTION 5.

I would have to explain to Claire why Miss Kemp is having Salbutamol administered by a nebuliser. I would have to explain about asthma causing spasms in the bronchioles and the fact that the nebulised solution is going straight to the lungs and is therefore, the quickest way of getting vaso dilators, the bronchodilators to her lungs to relieve the spasms, to allow air to get into the passages. Obviously the saline mixed with the salbutamol act as a carrying agent which moistens the linings of the lungs and allows a larger spread of the salbutamol. As the time is now half past eleven I am going to continue going over the answers that I would write for the PSCH just using the dictaphone.

I am finding that it is taking too long writing the answers to the question as well.

QUESTION 6.

That Mrs Briggs has a satisfactory home assessment and I think most important thing here would be to talk to Mrs Briggs herself and find out how confident she feels about going home and what problem she feels she has. It says here she is very keen to try and go home and as she is my patient, if she wishes to go home and everyone feels she is capable of going home I feel I should support her and this decision, however Mrs Briggs' daughter is angry and distressed, this may be because she is very worried about her mother and feels that she would not be able to cope at home. obviously I would have to talk to Mrs Briggs daughter and find out exactly what she is worried about, she may be worried that she will have to climb upstairs and use the commode, whereas if she has a commode by her bed this will be easily dealt with. There may be other reason for the worries that we have not covered in our assessment, therefore useful information may be found. It may be useful to try and get Mrs Briggs daughter to discuss these problems with her mother. And it may be that the daughter that not been sufficiently informed as to what support her mother is to be sent home with or even she may not be aware of her mother's own capabilities since she has been seen by the occupational therapist.

QUESTION 7.

When Mrs Ball has got her Warfarin because the bottle is empty, I would obviously state that Mrs Ball needs her warfarin and I would inform the senior nurse that there is no warfarin bottle and would try and arrange to borrow some warfarin from another ward. If we have problems getting the warfarin and if we thought that it was going to be very delayed before we received it, obviously we would have to let the doctor know just in case he would like to make any other arrangement such as giving Mrs Ball any further intravenous heparin.

QUESTION 8.

With Mr White's friend, first of all, it would be a good idea to ascertain how closely he lives with Mr White since he would be there helping him with his daily activities of living. It would be important to explain to him what a stroke was and how it had affected Mr White> you have to indicate what the problem was with his weakened side and to encourage him to use this side as much as possible to regain the use of these muscles. Mr White would have been given the specific exercises by the physiotherapist. Mr White could help him do these and also he could just give him help and support. Mr White would probably appreciate this more than any specific help. As far as health information was involved in trying to avoid Mr White in having another stroke, it would be important to point out the risk of smoking or drinking too heavily, also the fact that stress could elevate his blood pressure and increase the risk of him having another stroke. If Mr White is on any drugs to help his blood pressure it would be important to stress to Mr White's friend that he takes these on a regular basis. It might be well to mention that Mr White has become very frustrated and to explain to his friend why this is so and that he may be like it in the future and that his friend must help him get through these problem and try and set small goals that Mr White can feel that he is achieving without him having to become too frustrated.

QUESTION 9.

With regard to the leaking pipe, the first action would be to ensure that the leak is not causing any specific danger to the patients. Mrs Ball's bed will have to be moved out of the area and any electrical equipment will have to be moved away from the leak to avoid the danger of shorting and fire. Depending on the severity of the leak I will try and take action to prevent it and if the leak is very severe I will have to contact the Nursing Officer to report the problem. I would also need to contact the duty works department to try and come and fix the leak immediately. As the floor is probably wet and therefore dangerous, I will have to put out some kind of warning system to prevent any one falling over this area and dry out the immediate spillage as I can. Mrs Ball and her bed will need to be changed and made comfortable again and any visitors who had become wet would need to offered help in drying out their clothes.

QUESTION 10.

To evaluate the care that I have given to the patients throughout the day. I would first of all have to talk to my student Claire and together we would go over the care plans of each of the individual patient and check that all necessary care had been given. The care plan would need to be changed and updated at this point also. I would quickly assess each patient trying to find out the change in their situation since I started the shift so I could let the night shift know any problem they are likely to meet with the patients. Having gone over the care plans and written the kardex with my student, I would have to find out how she feels about how the day has gone, if she feels there is any important areas we missed out on, how she feels about Mr White now, she has had time to think about why. To evaluate whether the care we have given this afternoon was effective I think I would go over each patient individually. For instance it would be important to mention in the kardex and to the night staff that Mr White was probably still feeling down and unsupported and he would need a lot of gentle encouragement to try and regain his motivation. Mr Bond will need to be fully prepared for his bronchoscopy tomorrow. He will need to sign a consent form for this and his notes and X-ray should have been sorted out to enable a smooth progress tomorrow. It would be necessary to tell the night staff that he is anxious and would probably not be able to sleep and may need to talk over his problems with somebody during the night. I would have to assess how Joy Kemp is at the moment whether her state of breathlessness is much improved and to warn the night staff that she would need to be carefully monitored to ensure that her asthmatic attack does not recur, also I would have to make sure that Mrs Kemp has been fully admitted and that her next of kin is aware that she is on the ward and we have information to contact the next of kin if the need arises. I would also have to make sure that Mrs Kemp was aware of what was going to happen to her over the next day or so. I would have to check that Mrs Briggs is continuing in her progress towards home and she has not resorted to any confusional state and also hope

that the situation with her daughter has been resolved and if it has not to highlight any specific problem which may be necessary to know by the night staff for the next shift. For Mrs Ball, I would hope that her Warfarin has been administered by now, if it has not the problem would have to be passed on to the night staff as she would probably need her dose of warfarin and if it does not arrive, then the physician may need to take further action. I would need to check that Susan's colour and respiration are still normal and that she has not had any problems since the after the leak. I will need to check that the leak is being repaired and if it is not that the situation on the ward is not becoming worse and that its repair is being organised. I would obviously have to thank the student for her help and make sure she did not have any problems before she went home.

Transcription of semi-structured interview: part contribution of one participant

Researcher: Good afternoon M.... and thank you very much for coming and thanks very much for subjecting yourself to this interview. I hope you do not mind the recording tape.

Participant: No.

Researcher: I circulated a paper to you that sets in perspective my research proposals with London University. Have you had a chance to read it?

Participant: I have.

Researcher: Have you got any comments to make?

Participant: No, I thought it was interesting. I read it a little time ago when you first gave it out and I have read it again.

Researcher: Now I had some criteria in mind before I decided to use teachers within the college. One is that they have been in post for longer than two years, secondly they have been involved in the structuring of problem solving case history paper or preparing papers for exams or assessment purposes, thirdly they are experienced markers and fourthly they have partaken in evaluation and that kind of thing.

What is your perception of the problem solving case history paper?

Participant: I quite like them, I have not come across them at all until I came here, the reason I like them is that they are clinically orientated. The students, I feel don't like them and some teachers do not like them because they are sometimes difficult to set and they are quite often problematical and I accept those comments. I quite like them because very clinical orientated. And I think they test knowledge quite well. The students, in my opinion, that seem to fail it are weak students and have failed things time and time again or students that have just slipped up on silly little errors, really and they tend to pass it on their second attempt after they have been corrected. No I like them. I think they are good assessments.

Researcher: Is this college the first college you have come across where the PSCH is used?

Participant: Yes it is.

Researcher: So you have had no experience whatsoever prior to setting foot here.

Participant: No, none. Not as a student either.

Researcher: You mentioned earlier on that it tests knowledge extremely well. In what sense you feel it does so?

Participant: I think the different papers in the college reflect different things that they want to test, and I feel Unit six particularly test very detail knowledge. very detailed A & P Knowledge. Unit 8 one tests more principles of care that the students can apply to situations and still tests knowledge in relation to Physiology and Pharmacology. The failure rate on those questions tends to be higher, but I do think it tests principles of care quite well. At the end of the day you feel where students have passed, they have passed because they were safe and with the change in health care ones, we always come across things that we don't know and I think that if you can sort it out and deal with it safely, you know problem solving type of action, then you got principles of care to attend to.

Researcher: Now, what I am interested in is how valid the test is, I am in the domain of validity and reliability. Looking at the paper, itself, what is your perception of what it is supposed to be measuring?

Participant: Unit 8 paper is trying to test aspect of relating again I think it is trying to test Rule 18 and safe principles of care of care.

Researcher: What do you mean by Rule 18 Participant?

Participant: Competencies.

Researcher: I will come back on that. The whole essence behind my research is that it makes the assumption that PSCH papers test problem solving skills in students. What comments do you have to make about this.

Participant: Prior to the last paper that was implemented, the one that caused, Jan 90 paper caused a lot of hassle. I think I would question whether it did or not. I am not sure hundred percent whether it did. But the Jan 90 paper that was implemented, the students did not like this paper, as soon as they turned it over they did not like it whatsoever. And yet it caused one of the highest pass mark we've ever had. And I wondered whether because the students actually perceived it was difficult they actually stopped and thought about what they were actually writing and try to problem solve things out. And think about the most important logical thing I need to put in the question, whereas perhaps on other papers where students have perceived are easy enough, they haven't particularly thought about they were doing and did not problem solve it out and got lulled into a false sense of security and they tend to fail on silly little things. Judging by the last paper implemented, I feel that it does very mush test problem solving.

Researcher: Referring to the discrepancy you pointed out, Do you think that arose as a result of the way the paper has been constructed or is it to do with the

nature of the test itself?

Participant: No the way the paper was constructed. Some of the content on there I knew what had been taught and what had not been taught and some of the content in there that fell into Unit 8 consolidation week when a lot of students absconded and went off on holiday early. I mean I forgot about that when I was involved writing the paper, but on reflection, because those questions did not appear to be answered very well .. I thought ah well I remember now they all went off on holiday. It is the first paper that I constructed with other people as oppose to being on a one man band. I constructed it with two very experienced clinical nurses that tend to have very high expectations of their own performance and students performance clinically. I wonder whether that is why a different paper at face value came out. When I looked at the answer guide I thought it was a fair paper and I felt that it was a fairly easy paper but there are a lot of things coming through the patients profile in the questions that perhaps were more difficult. I do not think it was more difficult, it probably looked more difficult. I think we are running out, tried to stride to create different profiles now so you know let us see what we can pull out of the bag for something different yet, do we have to stick in an MI patient or a stomach patient for example. I think the difficulty was from the construction angle.

Researcher: I am reflecting on the comment you made earlier on that students found that to be very difficult. Could that be attributed to the fact that the situations depicted to students were totally novel to them or appeared to be?

Participant: I think perhaps, appeared to be. One of the profiles related to a patient with obstructive jaundice and lot of the students said they had never card for a patient with obstructive jaundice. There was a patient there who had Tuberculosis, the questions related to those patients tested principles of care, I think that is why they got through the paper. I think it was perhaps the profiles which students perceived to be different they did not see the TB questions as principles like we can do because we stand back and look at it and we know what we are looking for. They just saw TB and freaked out, so I think that why.

Researcher: For students who passed the paper, what did that predict?

Participant: I suppose theoretically, especially in relation to that paper, it should predict that in any clinical situation they come to they should be able to think on the principles of care and problem solve their way out of that situation and make sure the patient is safe I think that is what it should do theoretically. Whether it does or not I do not know. It is difficult to see because you do not follow the students up later on because the work is so compartmentalised in this programme and I don't know what happens to

them when they qualify unless they work in areas that I cover. But theoretically I think that it should do. Because at the end of the day there were profiles that they say they were not familiar with. There were some problems on there with language as well that they did not like, technical language and the language, but at the end of the day they did problem solve themselves out of that paper and passed.

Researcher: So, your perception, then, looking at the paper, you think that the construct that it is testing is about problem solving.

Participant: Yes. That's what we try to do, I am not sure that in the past we always managed to do that but I think that's what we are aiming to. We are always thinking of principles of care rather than specialist care because they have such narrow clinical experience in this hospital because they are so specialised.

Researcher: Looking at the paper as a whole, with the ten questions that are given to students, and the fact that we are using Rowntree's scheme we decided to have four questions at cognitive level four, three at cognitive level three and three at two. Now are there any particular questions at particular cognitive level that presents a challenge or conflict?

Participant: What, to the students or the paper?

Researcher: Well in terms of the paper itself. The kind of construct that it is trying to test.

Participant: Can you expand because I am not too sure what you are driving at.

Researcher: To be more specific, take the four questions that attempt to test level four, synthesis, do you necessarily agree that all four that are given in the paper would do just that?

Participant: No not the whole paper, no. I think some of the questions on that paper are on the Unit 8 paper that falls usually right to assessment an incident which I would say definitely come to a four. And admission definitely come through to a four and evaluation, I think assessment sometimes comes through, I think they are. Synthesising sometimes, but I think the evaluation question is often a recall exercise. I would question most of the evaluation questions.

Researcher: What do you think a recall exercise?

Participant: Partly because the students find time a problem in the paper and that is usually the last question, they are running out of time and they just use recall statements. which I feel is not an evaluation technique. I think also, because within the clinical area people do not evaluate properly and

therefore they do not have the skills to start with, I do not think they really understand evaluation or what the process is. I think that's part of the problem why that question I always feel never comes through as a level 4.

Researcher: So you are reassured, then, that all the other three do so.

Participant: Yes I think so, may be I could be wrong, I do not know, but I think so at level 4.

Researcher: Let's take question 1 as an example where it is looking at how students will plan the work, for the shift, based on your experience what comments would you like to make.

Participant: There are certain parts within question 1 that is recall. The beginning of that question is recall where they start giving a scenario, I think that is complete recall - eg. coming to say hello, prioritising and organising activities for the student. But when they start looking at the patients, they start looking at the patients problems and trying to identify what they feel are the most important problems that need to go down on paper rather than the less important ones they can leave off. I think, then, they are working at a higher cognitive level to be able to differentiate and also to be able to look at problems and apply care to them, I think.

Researcher: One of the major criticism relating to question 1 is the suggested proforma that students tend to adhere to when answering, and by virtue of this there is a risk that one is testing recall only other than problem solving.

Participant: I can see that, however this would depend on how challenging the profiles are because they could say ok for that information I need to write this set of observation down or this set of nursing care down or whatever. The marking guides that we generate, we are looking for specific things that are addressed to that particular patient rather than always if they do not write anything about physical care we will fail them on or whatever. I can see that it can be just recall, to a certain extent I think it depends on the profiles, how challenging they are. Profiles are very challenging, certainly the beginning of question 1 is purely recall.

Researcher: May be that is where the proforma is more in evidence. Because equally a lot of people would dispute that it is not a recall and there is plenty of evidence that students are problem solving by virtue of going through the motion of thinking and processing the information to make decision about which patient is the priority.

Participant: We certainly within Unit 8 PSCH ensure that we do not give them all the patients problems, we do not deliberately make things more abstract, but

perhaps like I said for example on the last paper the patient has particular whatever, I think we were not testing recall because we, I mean, all of us were looking for bruising and all the rest of it, I think it is problem solving not recall.

Researcher: Judging by the argument you put forward, the one that constitute a problem is number 10. You are obviously not convinced at all that there is an element of problem solving, despite the fact that you think by virtue of them running out of time, it is just a matter of them recalling facts.

Participant: Yes, I think they are just trying to complete the paper in a rush, they might just be problem solving within that question, I don't know, but I think a lot of it is just recall. They are just looking at what has happened in the paper and just saying has that changed, has that changed, is this OK. Some students don't always follow that format and may be will try to develop question 10 and will discuss and will ask if all the relevant people have been informed and if there is a need to follow up with Social Worker or next of kin etc. But, they quite often do not have the time for that. And I think that's why question 10 becomes a recall question.

Researcher: Does that still constitute a problem despite lengthening the time for the examination?

Participant: Yes, yes, it does, it would have eased off if it meant to be the time for the examination, but what they are doing is that they are writing more stuff on the paper rather than just keeping to what they are used to as before. I think that the less you give them to deal with the more they write about and the more you give them to deal with the better the paper becomes. I felt that it would have improved with the extension of time but it has not done so at all. We have kept the number of question the same, the format has not altered.

Researcher: Looking at cognitive level 3 questions what are the challenges you have come across in this area?

Participant: There is one question in Unit 8, we always have something one question on the lines of communication, communication type question, they know a problem or they do know a problem they have to deal with and I think that that particular question is pure recall. That might be the way we prep them, I think, but I think that is certainly a pure recall question, the other questions on Unit 8 that come through as a 3 are usually student teaching or patient teaching and the process part of the student teaching and the patient teaching is usually recall as well, the content part certainly is not, to the question, but, the assessing of knowledge is drummed into them the all way through the course to assess knowledge, set goals, evaluate what learning has taken place. All that part of the question, I think, is recall, but the content necessarily is not, I don't think.

- Researcher: So these are the two areas you have a slight problem with cognitive level 3.
- Participant: Perhaps we ought to change our format. I don't know, we always have the teaching coming through as a three and we always have the communication coming through as a three.
- Researcher: Looking at the communication question, would you pass a student, for example, if the student had not done it within the context of the situation.
- Participant: Would I pass them? No, no I would not.
- Researcher: So what would make you pass the student?
- Participant: Whatever they did that seemed appropriate for the patient, but offering solution to whatever has upset them, so yes, they are problem solving.
- Researcher: Do you want to explore that further.
- Participant: If you want. They are problem solving aren't they?
- Researcher: I don't know, I am not saying that I am right, I am just asking you whether you think that there might be an element of problem solving there.
- Participant: I think there is a certain element of problem solving, I think there is a lot of recall, but, yea, they do get a situation that they know about or that they do not know about problem areas and they do have to offer solutions on how they would deal with it. Under the communication skills part the examples are verbal and non verbal and identifying anxiety and all the rest of it and the team tissues they talk about is certainly recall. I think it is fair comment that they are dealing with it in the context of the patient situation they are in, that is not recall, that is problem solving.
- Researcher: If I may move on to cognitive level 2, What comments do you have about the types of questions asked?
- Participant: That has, in my opinion the highest failure rate in the paper, and again it might be the way we tend to structure the paper, I mean, certain questions almost always come through at certain level. It is getting quite a habit now, I don't know whether we should break away from it or not. It is one of our way of testing we have constructed the paper appropriately. Level 2 is always a physiology question, if they do not know it then they fail and that I think is really testing knowledge and it is always applied to a patient and so there is that on, there is also the pharmacology one which is usually general the question all have to be applied, that is the minimum level they have to operate at, which if they do not know they fail. Again it has got problem solving elements in, but the ones that hold

the highest pass mark among the level 2 is the management incidence, the watch goes missing, the patient disappears off the ward, or having an injury or whatever. A lot of that question is recall, they still have to be able to sort out in the incident note to be able to pass it. There is a lot in that part of the question that they can learn before they do, like contacting the manager before filling in the incident form etc.

Researcher: So what we have identified, then, is that irrespective of what cognitive level questions are set at, sometimes there may be problems in how questions are structured, that they may only be testing recall rather than any problem solving.

Participant: Yes, yea. It might be the way that we keep setting the paper the whole time that causes the problem.

Researcher: If I may, I have made a statement at some stage within the paper, where I mentioned that I believe that the PSCH is a tool that can measure processes that are more complex than the recall of facts. And I suspect that in so far as this test is concerned, arriving at the answer may be the outcome of several different mental processes. What views to you hold about the paper as a whole then in relationship to that statement?

Participant: Certainly in the second statement is that, if you, say for example, to draw a with a mathematical problem that we can all solve it in a different way, we can either divide by 10 or divide by 50 and may get to the same answer at the end, I think that is what you are implying, is that right.

Researcher: Yes.

Participant: Yes, I think that, I certainly agree with the statement particularly with the second one, I do think people all arrive there perhaps via different means and you see that when you are reading the answers anyway as the answers are constructed differently, surely if they are all thinking on the same mental process the answers would all look the same from student to student, they certainly do not. They do arrive via different mental processes. And I make that judgement because the answers are different from student to student. I certainly do think that they test more than just recalling facts. I certainly argue with level 4s, it does get them to problem solve, re admission and re incidents that we have within the paper certainly force them to problem solve.

Researcher: There is also a claim that the paper purports to reflect real life situation,

Participant: I suppose it depends what you mean by real life because students have very different clinical experiences. If I was to assess each individual student on their own individual clinical experience to reflect their real life experience, then I would be writing hundreds and hundreds of papers. So

to return to test them particular to what has been covered in the college I think that a lot of teachers make an effort to ensure that what is covered in the college is what is being done on the wards or what should properly be done on the wards with adequate resources. So, I think it does, the only thing that it does not reflect is that fact that we do work under restrained resources. But, then, I am not sure at this level that they would be able to operate within those restrictions anyway because they never have to make those decisions as third year students anyway. It the Senior Nurse that has to decide when there is not enough staff, when the skill mix is not right, when there is no hot water. I think that if we were to put this in the paper we would not be testing them fairly. The clinical situations do affect what goes on, particularly in what is perceived as realistic. The only thing that is difficult is keeping pace with what changes clinically, because I know, for example, for 2 papers that I did last year, one year I stuck in something I asked a pharmacology question on omnopon between writing the paper and the paper being implemented there was all that hooaha! and then it was all withdrawn and then on another paper, I had a question on silicon breast implant and then there was all that hooaha hit the press between the paper being written up and it being implemented. And we are really talking about a short span between 2 to 3 months between the paper being written and the paper being implemented. So from that point of view it does not reflect reality, You would need to do the paper the day before in order to do that.

Researcher: If the business of nursing is about problem solving, and having in mind about what goes on in the clinical situation. How does the PSCH compare with the other traditional methods? Like essay writing, the old GNC paper and ever the most recent ones the Objective Tests.

Participant: Well when I did my state finals I did essay questions and multiple choice and I just read every thing up from the medical and surgical textbooks and these objective tests and I don't think that the questions they were asking about my clinical skills, I had to draw a picture of a heart and blood vessels coming out of it, they did not ask me about what I was doing in clinical practice, what I felt the priorities were for an unconscious patient. I like the PSCH, I think they test broad, I think some of the traditional methods are very narrow and I think they are much more clinically orientated than more traditional methods. I have done some other assessments for my ITU course, I did one at Guy's which was mixed extrapolation, you got given an ITU chart and you had to look at the data that was on it, the CVP, Urine output, Bp Pulse etc and you had to guess what happened at that particular moment in time or you have to guess which drug was given at a particular point in the chart. I like that paper, it is difficult and I questioned what it was trying to do sometimes. I like it because it was clinically orientated and that's why I like the PSCH. Because I see it as clinically orientated.

Researcher: You know since Bendall did her work in 1972, and I know it is a bit old hat, but nevertheless it was relevant in the sense that what she discovered was that what students wrote in exam papers only reflected what they were taught at college and they did not reflect anything that happened in the wards. Although the ENB tried to address that, and there was evidence that people had done something about this, do you think the situation would still exist with the use of PSCH?

Participant: What that the PSCH papers, the students write down what they were learning in college rather than what they were doing in the ward. Certainly to an extent here, because each student has done very different clinical experiences, this is not a general district hospital you have got students who have done some very high tech oncology and some have done some very high tech neuro surgery and they are coming together to do the same exam. That's why I think they have to test some general principles of nursing care, so from that point of view it does not reflect perhaps what they do on the ward because they might never have ever done that on the ward, but I think because it is trying to test the way its constructed within Unit 8, principles of care and the students have applied principles of care to someone who is bleeding on a neurosurgical ward and an oncology ward, then it does reflect their clinical experience. If the paper was constructed to ask for any detailed stuff about neurosurgery which is again more recall than problem solving, I think it does, it does.

Researcher: If I may come back to the statement you made right at the beginning which is about competencies. How far do you think the test tests competencies?

Participant: I don't think it tests them completely, I think it makes some attempt certainly looking at the competencies I am thinking of some of the questions that are on the paper. say for example advise on the promotion of health and the prevention of illness, well the teaching question they have in U 8 will certainly reflect some of that. I do not think that you can test all of it within a short 3 hour paper, it certainly does make an attempt to test that and recognise situation that may be detrimental to the health of the individual or the incidence that happen in level 4, then I think that is as this is always an emergency situation, so I certainly think it makes quite a fair attempt at trying testing those within Unit 8, I am not so sure if it does so within other Units as those units students are so junior and they would not be so near this whereas within Unit 8 they are third years and they are almost ready to qualify. I think it makes a good attempt at testing the competencies. Say for example working within a team with other nurses, medical and paramedical staff & social workers. The paper talks about working with other nurses, but we very rarely bring in stuff about social workers and paramedical so I think from that point of view it does not.

Researcher: Relating to marking Participant, Have you got areas of concern?

Participant: From personal point of view I am labelled as a hard marker and that is something I have to deal with. From the paper's point of view and the marker's guidelines we fail on safety and that is a criteria across all markers and I think the moderation process tries or attempts to bring us all in line. The only thing that I do find difficult here is these students are doing a Diploma in Nursing studies and always other people say oh this PSCH is a Diploma Course PSCH, but as far as I am concerned, because we fail on safety those criteria would be applied to these third year students or certificate students or BSc students that are doing a certificate RGN course, so that's what I find a problem from marking. I can't see how that is a Diploma PSCH, I see it as a Certificate one because we are using safety as a criteria which every body should be able to pass not just Diploma students, so that's my one concern.

Researcher: Have you got any concern about reliability between markers.

Participant: Personally, I think the moderator should sort that out, theoretically, about reliability between markers. With the Unit 8 markers, I know it takes three markers to mark the script and one moderator to conduct moderation and standardisation. Usually the three people who are involved in the marking are Roger, Barbara and myself and Anne tends to do the moderation. I am usually at the stricter end, Roger the other extreme and Barbara in the middle. Anne is very good at sorting out the middle ground. I think, the reason why I may be perceived as being so strict is due in part to my inexperience compared to other people. I am not saying that I am an inexperienced marker, but compared to others I am. I still feel relatively very inexperienced and I have high expectations of myself and may be that is reflected in my marking. I make a conscious effort now to stay on the focus of safety and last time I had my paper changed by a moderator as opposed to others, so I think from a reliability point of view there is a problem in Unit 8 and certainly I am trying to address that as a marker and the problem is me as an individual not the paper or the marking guidelines, but how I interpret them and I think it is difficult try and remember that sort of objectivity.

Researcher: I have asked you a lot of questions Participant. Is there any area that you feel I should have covered but did not?

Participant: I don't think so. There is something that I would like to add. I feel that students that fail, when they come to their resit tutorials, quite a lot of them have failed other things, other problem solving papers or have achieved low marks in other assessments, so I think from looking at trying to identify weak students that do that I think we have covered it all.

- Researcher: There is one last thing M.... Prior to you coming here to work you have worked with students who have not been subjected to PSCH assessments and since coming here you have worked with students who have been subjected to this format of assessment, - there is plenty of evidence that the method of assessment that you use, often dictates the type of learning styles that students use, i.e some assessment encourage surface learning & others deep learning. What has been your perception of students here as compared to students from your previous place of work?
- Participant: Difficult, because I worked in a College that was attached to a district general hospital within a small little area and all the students that came there happen to be brought up locally and only have 5 O-levels. Here you get students coming from all parts of the country, it's a Diploma course, students who coming in with just 5 O-level are usually in the minority so I wonder if the perception somehow reflects that. I think they are more independent, they use you more as a resource and I think they are more independent in their learning compared to other students where I worked before who did not do any independent learning and never came near you, but that might be the different cultures.
- Researcher: Do you think our students are necessarily better problem solvers?
- Participant: I do not know, that would be delving too much in the dim and distant past to be able to give a fair objective opinion. This is two & a half years ago.
- Researcher: Thank you very much M... for your time. That concludes the interview. It is approximately 5.23hrs.

END

Question 2: Cognitive Level 4: Formulation		
<p>When writing Mr Bond's care plan, what problems might he experience following the bronchoscopy and biopsy and how would your care be planned to observe for and minimise these.</p> <p>Formulating and solving own problems: by selecting, generating and applying facts and principles (e.g. What do I see as the problem here and how can I reach a satisfactory solution?). This cognitive level goes beyond application and selection, it requires the production or creation of solutions, or ideas rather than the recognition of appropriate relationships, products or judgements. Formulation incorporates analysis behaviour which requires that the parts of a document, plan, or idea be identified or that the relationships between such parts be established. For example a care plan might be analysed to determine the relationship between diagnosis and assessment data, or to examine the appropriateness and consistency of short term and long term goals.</p> <p>Formulation requires the student to synthesise, which is the process of combining parts or elements from several sources to create an idea, theory, plan, or structure which is new. Using assessment data to construct a patient's care plan is an obvious example, preparing a patient teaching plan is another. The student is also expected to evaluate, that is making judgements about the quality or value of materials, or procedures. Self imposed standards or standards generally accepted in the field and used as criteria for making judgements. Examples of evaluations include judging the appropriateness of aspects of care plans, the quality of care given to a patient, the feasibility of team staffing plan or the acceptability of modified procedures.</p>		
Subject's Response	Problem-Solving Activity	Cognitive Ability
Could involve problem with his airway	Problem setting (subject is naming what s/he will attend to) Subject has established relationship between bronchoscopy and biopsy and the probability of respiratory distress	Formulation: (What do I see as the likely problem here?)
Bronchoscopy could involve swelling of his airway	Problem identification (Subject is establishing a possible cause between bronchoscopy and respiratory distress)	
If there is any kind of blockage in his throat already	Identification of potential problem (If problem exists then)	Application of rules and general principles
I would have to watch him for sign of respiratory distress	Action to monitor the occurrence of potential problem	
He had a biopsy, there may be the possibility of haemorrhage	Identification of potential problem Problem setting	Formulation

In which case his vital signs would need to be closely observed	Action: monitor for problem occurrence	Application of rules and principles to monitor for haemorrhage
Mr Bond would need to have a chest X-ray	Action to diagnose (to rule out problem) precautionary measure	Selection
To ensure that this has not occurred before he is allowed to eat or drink	Reason for more information	Rationale
It would be advisable for Mr Bond to start drinking sips of water	Action in case problem has occurred	Rationale: application of rules or principles
Before he would be allowed a normal fluid and dietary intake	Reason for above action	
The possibility of pain following bronchoscopy	Problem setting	
Mr Bond will have to be observed for signs of non-verbal pain	Action to monitor if problem occurs	Application of rules and principles
As whether he requires any analgesia	Action to deal with problem	Selection
Oral analgesia may be difficult to swallow, so he may need some Intramuscular analgesia	Treatment option	Selection
He would have to be assessed at the time	Intent to evaluate effect of treatment: intent to make judgement about effectiveness of treatment	
Mr Bond is likely to be very anxious after the diagnosis	Problem identification and problem setting	Formulation
The more anxious he becomes the more painful his throat would become		
The less receptive he would be to the information	Predicting how the patient is likely to respond	

The less receptive he would be to the treatment he is given		
Therefore, it is important to assess what he knows about his diagnosis	Anticipatory action in likeness of problem occurrence	Application
Make sure he understands what it entails		

Question 8: Cognitive Level 3: Selection Whilst visiting, Tim's friend who is named as next of kin asks you what he can do to help Tim recover and prevent him having another stroke. What information would you give him to help him promote and maintain Tim's health? Selection: is the ability to make choices from a number of possible options. The student must decide, from all that s/he knows and from the information provided in the vignette, what the likely source of the problem is, and, use and apply the general rules and principles in the situation. Selection incorporates both recall and application.			
Subject's response	Problem-Solving activity	Level of Cognitive Ability	
I am told what the problem is: the potential problem of Tim White having a stroke	Reflecting on problem given and the task at hand	Recalling information from the vignette	
It is about how to prevent it. I am asked directly what information I would give to promote his health			
So the information I would give would be concerned with educating Tim about losing weight	Reflecting on the task at hand and focusing on what may have caused the problem	Recalling facts and principles	
I would have to explain physiology I think of atheroma build up due to high fat diets and lack of exercise	Statement of intent Establishing link between cause and effect		

So I would inform them about diet and exercise	Statement of intent	Recall
I would find out from him what kind of diet he already takes	Statement of intent Information seeking	
There is no point in sitting and going on about a healthy diet if that is what he already eats	Statement: attempt to justify previous statement of intent	
If he does not eat a healthy diet on account of being three stones overweight, I would assess what his understanding is of the effects of diets and exercise	Statement of intent Information seeking	
Try to refer him to the dietician, try to get the dietician to talk to him	Action: possible option	Selection
Talk it over with him and offer him any literature that we have on the ward about the Health Education Council booklet about diet and exercise.	Action: Possible option	
I would offer information about life style and stress at work	Statement of intent	
If there is any problem does he jump up and down and get excited	Proposed action Information seeking	
I would mention the fact that earlier on in the ward, for instance, he did get very angry and distressed	Establishing link between behaviour and problem	Recall
Perhaps it would appear to me that his method of coping with stress had been having a detrimental effect on his health	Inference drawn from previous behaviour	

<p>If he is not managing to work the problem through and the effect that this anxiety would have on his blood pressure</p> <p>So it would be important to give an explanation of why he has had a stroke and link that into what he can do to prevent him having another one</p>	<p>'If – then' statement</p> <p>Statement of intent</p> <p>Establishing link between cause – effect – and prevention.</p>	Application
I think that coping with stress should be one of them	Option	Selection
As a business executive, what kind of hours does he keep	Information seeking	
You know, obviously he would be sitting at a desk all day, he does not get much of a chance to exercise – that would need to be looked at	Establishing link between employment and possible life-style	
Does he have many business lunches and that sort of thing which would need to be sorted out	Information seeking	
Obviously, if his problem is linked to his life style and his job, it is something that is going to need more than myself just sitting there and handing a few leaflets	'It – then'	
It is going to need a whole new review, it is very much going to need Tim White himself wanting to improve his health, wanting to avoid a stroke	Exploring possible options to deal with stated problem	Selection
And it depends on how important it is to him, so he is going to need to look at that		
Also, I think it is important that he understands what his role is in improving his health and preventing another stroke		
I would find out how much he wanted to know, perhaps he would like to speak to the doctor, perhaps he would like to speak to the dietician	Information seeking	

Whether he may need some kind of counselling service as regards his coping mechanism for stress	Exploration of option	Selection
You would have to assess his understanding, his level of knowledge and offer help that is appropriate for him	Statement of intent Information seeking	

Question: 5 Cognitive Level 2: Application

Miss Kemp has been prescribed Salbutamol 2.5 mg. Diluted with 2ml saline administered via a nebuliser.

Student Nurse Bush states that she does not understand why this particular route of administration has been chosen.

With reference to physiology, explain the advantages of administering Salbutamol this way.

Application: The ability to use rules and general principles in particular situations. It therefore requires that the respondent be able to use what s/he knows and understands in an unfamiliar or novel situation. The respondent must decide which abstractions in his or her entire repertoire should be retrieved to solve a problem or answer a question. It requires the respondent to rationalise how the solution helps resolve the problem. Problems are 'givens'.

Subject's responses	Problem-Solving Activities	Level of cognitive ability
The problem given is that Nurse Bush does not understand why salbutamol is given via a nebuliser.	Reflecting on problem given	
You have got to refer to physiology and explain the advantages	Reflecting on the task at hand	Recall
You have got to say what is happening to the bronchioles and asthmatic attack		

Bronchioles are constricted because it is an allergic reaction to an allergen or irritant	Establishing link between cause and effect	Recall and application
The allergen or irritant causes histamine to be produced thereby causing constriction of the bronchioles		
The advantage of giving drugs via a nebuliser is that it achieves a direct effect at the source of the constriction	Recalling factual information	Recall
Explain that if you took tablets it will have to work its way through the gastrointestinal system and then into the blood stream and then directly to the site	Recalling factual information Explanation of process involved	Recall and application
Administration via a nebuliser is a direct advantage where this is breathed in and the importance of explaining to patients the good technique of ensuring that they do take in a good breath whilst they are using the nebuliser.	Focus on rationale	

